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CALIFORNIA MINERAL PRODUCTION

AND

DIRECTORY OF MINERAL PRODUCERS

FOR 1943

BULLETIN 128

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WALTER W. BRADLEY State Mineralogist

San Francisco] BULLETIN No. 128 [November 1944

CALIFORNIA MINERAL PRODUCTION

AND

DIRECTORY OF MINERAL PRODUCERS

FOR 1943

By
HENRY H. SYMONS

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LETTER OF TRANSMITTAL

To His Excellency, THE HONORABLE EARL WARREN,
Governor of the State of California.

SIR: I have the honor to herewith transmit Bulletin No. 128 of the Division of Mines, of the Department of Natural Resources, being the annual report of the statistics of the mineral production of California.

The remarkable variety, total values, and wide distribution of many of our minerals revealed herein show California's importance as a producer of commercial minerals among the states of the Union.

Respectfully submitted.

WARREN T. HANNUM,
Director of Natural Resources.

INTRODUCTION

It is the endeavor of the staff of the State Division of Mines (formerly State Mining Bureau), in these annual reports of the mineral industries of California, to so compile the statistics of production that they will be of actual use to producers and to those interested in the utilization of the mineral products of our State, while at the same time keeping the individual's data confidential. In addition to the mere figures of output, we have included descriptions of the uses and characteristics of many of the materials, as well as a brief mention of their occurrences.

The compilation of accurate and dependable figures is an extremely difficult undertaking, and the State Mineralogist takes the opportunity of here expressing his appreciation of the cooperation of the producers in making this work possible. A fuller appreciation of the value of early responses to the requests sent out in January will result in earlier completion of the manuscript. Statistics lose much of their value if their publication is unnecessarily delayed.

Some of the data relative to properties and uses of many of the minerals herein described are repeated from preceding reports, as it is intended that this annual statistical bulletin shall be somewhat of a compendium of information on California's commercial minerals and their utilization.

WALTER W. BRADLEY,
State Mineralogist.

STATE OF CALIFORNIA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF MINES
WALTER W. BRADLEY
STATE MINERALOGIST
OUTLINE MAP
OF
CALIFORNIA
SCALE
OREGON
NEVADA
PACIFIC OCEAN
MEXICO
SISKIYOU
MODOC
TRINITY
SHASTA
LASSEN
HUMBOLDT
TEHAMA
PLUMAS
GLENN
BUTTE
SIERRA
MENDOCINO
NEVADA
LAKE
COLUSA
PLACER
YOLO
EL DORADO
SONOMA
NAPA
AMADOR
ALPINE
SOLANO
CALAVERAS
MARIN
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SAN JOAQUIN
TUOLUMNE
MONO
SAN FRANCISCO
ALAMEDA
STANISLAUS
MARIPOSA
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MONTEREY
FRESNO
INYO
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TULARE
SAN LUIS OBISPO
KERN
SAN BERNARDINO
SANTA BARBARA
VENTURA
LOS ANGELES
ORANGE
RIVERSIDE
SAN DIEGO
IMPERIAL

MINERAL INDUSTRY, CALIFORNIA, 1943

DATA COMPILED FROM DIRECT RETURNS FROM PRODUCERS IN ANSWER TO INQUIRIES SENT OUT BY THE CALIFORNIA STATE DIVISION OF MINES, FERRY BUILDING, SAN FRANCISCO, CALIFORNIA

CHAPTER ONE

The total value of the mineral output for California for the year 1943 was $426,445,280, being an increase of $17,706,846 over the total of 1942 which was $408,738,434. The increase was due to stimulated output owing to war demand. There were sixty different mineral substances, exclusive of a segregation of various stones grouped under gems; all fifty-eight counties of the State contributing to the list.

As revealed by the following, the salient features of 1943 as compared with the previous year were: Increases in total value were registered by such groups of mineral substances as fuels, industrial materials, and salines, while the metals and structural materials showed a decline in total value. Of the year's mineral output, petroleum showed the greatest increase in value, followed in turn by natural gas, iron ore, copper, diatomite, chromite, quicksilver, zinc, gem materials, tungsten ore, etc. Decreases were registered by gold, cement, miscellaneous stone, silver, brick and hollow building tile, etc. The greatest annual values for their output in California were recorded by bromine, diatomite, dolomite, gypsum, iron ore, iodine, limestone, magnesium salts, molybdenum ore, quicksilver, soda, and tungsten ore.

Of the fuels, petroleum showed an increase in value of $46,841,861 and an increase in amount from 247,491,289 barrels to 284,145,702 barrels of crude oil. The 1943 output of petroleum was the largest in amount with the exception of that of 1929 when 292,534,221 barrels were produced. The amount of natural gas utilized increased from 413,180,942 M. cu. ft., worth $25,698,052, to 443,219,847 M. cu. ft., worth $28,046,729, and was the largest annual consumption from this State, and its value was only exceeded by that of 1929.

Of the metals, an increase in annual value was recorded in all materials except gold, silver, and the platinum group metals. The value of the gold yield decreased from $29,679,895 in 1942 to $5,191,480 in 1943 which is the smallest annual output in both amount and value since 1848 when gold was discovered in California, and for the first time the value of other metals; namely quicksilver and tungsten, exceeded that of gold and the increases in values were not enough to offset that of gold. Copper increased from 2,138,149 lbs., worth $258,716, to 17,172,440 lbs., worth $2,232,417; quicksilver increased from 30,087 flasks, worth $5,553,357, to 33,948 flasks, worth $6,177,159; and tungsten ore from 231,201 units, worth $5,586,770, to 254,118 units, worth $5,910,745.

Of the structural materials, all materials classed under this group showed a decline in production from 1942. Cement decreased from 23,306,578 barrels, worth $35,808,841, to 18,515,085 barrels, worth $27,-

865,466; miscellaneous stone decreased from a total value of $27,281,342 to $21,716,223; and brick and hollow building tile decreased from a total value of $5,708,967 to $4,368,675.

Of the industrial materials, the group as a whole increased in total value from $8,606,428 to $10,706,955, with such items as barite, bentonite, diatomite, dolomite, gem materials, gypsum, limestone, mineral water, pyrite, and talc and soapstone showing increased outputs, and carbon dioxide, pottery clay, pumice and volcanic ash, slate, and strontium minerals a decreased value.

Of the saline group, the total value increased from $15,645,003 to $15,660,400, with slight increases in value registered by borates, bromine, calcium chloride, iodine, magnesium salts, potash, and soda; and with salt the only substance under this classification to show a decline in output.

By Substances

The following table shows the comparative yield of mineral substances of California for 1942 and 1943, as compiled from the returns received at the State Division of Mines, San Francisco, in answer to inquiry sent to producers:

Substance	1942		1943		Increase+ Decrease— Value
	Amount	Value	Amount	Value	
Asbestos	8,319 lbs.	$836	*	*	*
Bentonite	7,453 tons	67,503	11,480 tons	$118,257	$50,754+
Borates	203,716 tons	4,929,553	216,687 tons	4,953,174	23,621+
Brick and hollow building tile		5,708,967		4,368,675	1,340,292—
Carbon dioxide	193,143 M.cu.ft.	310,000	227,424 M.cu.ft.	248,126	61,874—
Cement	23,306,578 bbls.	35,808,841	18,515,085 bbls.	27,865,466	7,943,375—
Clay (pottery)	622,958 tons	1,200,293	622,019 tons	1,185,240	15,053—
Copper	2,138,149 lbs.	258,716	17,172,440 lbs.	2,232,417	1,943,701+
Dolomite	142,552 tons	413,469	331,251 tons	472,756	59,287+
Gem materials		570		329,868	329,298+
Gold	847,997 fine ozs.	29,679,895	148,328 fine ozs.	5,191,480	24,488,415—
Granite		186,872		148,160	38,711—
Gypsum	425,268 tons	791,892	495,967 tons	916,883	124,991+
Iron ore	99,092 tons	371,562	907,458 tons	2,341,827	1,970,265+
Lead	10,329,176 lbs.	692,054	11,811,034 lbs.	885,827	193,773+
Limestone[a]	474,764 tons	1,155,352	495,262 tons	1,378,647	223,295+
Magnesium salts	6,026 tons	642,680	9,026 tons	728,065	85,285+
Mineral water	17,559,686 gals.	567,897	22,022,314 gals.	814,700	246,803+
Natural gas	413,180,942 M.cu.ft.	25,698,052	443,219,847 M.cu.ft.	28,046,729	2,348,227+
Petroleum	247,491,289 bbls.	242,481,545	284,145,702 bbls.	289,323,406	46,841,861+
Pumice and volcanic ash	55,603 tons	209,539	21,154 tons	142,665	66,874—
Quicksilver	30,087 flasks	5,553,357	33,948 flasks	6,177,159	623,802+
Salt	672,324 tons	1,922,991	631,776 tons	1,695,231	227,760—
Sandstone		8,587	*	*	* —
Silica (quartz and glass sand)	193,174 tons	692,762	161,318 tons	533,434	159,328—
Silver	1,450,440 fine ozs.	1,031,424	609,075 fine ozs.	433,120	598,304—
Soapstone and talc	47,782 tons	545,509	63,012 tons	723,056	177,547+
Soda (soda ash and salt cake)	267,723 tons	3,125,078	260,590 tons	3,166,576	41,498+
Stone, miscellaneous[b]	45,455,085 tons	27,281,342	32,499,456 tons	21,716,223	5,565,119—
Tungsten ore	231,201 units	5,586,770	254,118 units	5,910,745	323,975+
Zinc	1,275,795 lbs.	118,659	5,170,627 lbs.	558,427	439,768+
Unapportioned	[c]	11,695,867	[d]	13,838,941	2,143,074+
Total value		$408,738,434		$426,445,280	
Net increase					$17,706,846

* Included under 'Unapportioned.'

[a] Includes onyx and travertine.

[b] Includes macadam, crushed rock, ballast, rubble, riprap, sand and gravel.

[c] Includes antimony, baryte, bituminous rock, bromine, calcium chloride, chromite, coal, diatomite, feldspar, iodine, lithium salts, magnesite, manganese ore, marble, mineral paint, molybdenum ore, paving blocks, platinum metals, potash, pyrite, quicksilver, sillimanite group, slate, strontium, sulphur, titanium, tube mill pebbles, tungsten ore.

[d] Includes asbestos, barite, bituminous rock, bromine, calcium chloride, chromite, coal, diatomite, feldspar, iodine, lithia, magnesite, manganese ore, mineral paint, molybdenum ore, platinum group metals, potash, pyrite, sandstone, sillimanite group, slate, paving blocks, tube-mill pebbles, strontium, titanium.

By Counties

The following table shows the comparative value of the mineral production of the various counties in the State for the years 1942 and 1943:

County	1942	1943
Alameda	$6,450,260	$5,336,917
Alpine	3,097	20,241
Amador	2,092,030	534,098
Butte	2,400,858	755,968
Calaveras	2,998,235	2,831,543
Colusa	41,710	93,486
Contra Costa	3,729,010	4,284,821
Del Norte	401,253	609,664
El Dorado	1,320,250	304,449
Fresno	24,790,524	41,039,427
Glenn	504,755	915,030
Humboldt	294,805	237,827
Imperial	507,130	685,203
Inyo	8,134,848	8,025,406
Kern	75,529,067	94,245,359
Kings	12,955,120	16,015,695
Lake	832,712	798,381
Lassen	35,236	25,353
Los Angeles	106,120,578	100,688,245
Madera	87,727	55,575
Marin	229,269	280,119
Mariposa	1,321,238	443,693
Mendocino	133,995	82,480
Merced	1,848,319	1,118,313
Modoc	53,330	28,691
Mono	140,764	56,205
Monterey	576,152	1,142,800
Napa	1,447,638	948,557
Nevada	5,956,238	890,647
Orange	27,508,497	28,068,896
Placer	1,335,034	277,283
Plumas	346,936	207,509
Riverside	7,271,099	5,452,740
Sacramento	9,884,746	6,588,998
San Benito	3,104,054	3,528,462
San Bernardino	24,638,661	22,042,939
San Diego	1,188,661	1,650,586
San Francisco	110,140	432,500
San Joaquin	2,079,078	1,621,661
San Luis Obispo	1,031,114	1,037,062
San Mateo	3,874,496	3,041,434
Santa Barbara	11,415,045	16,830,725
Santa Clara	9,204,217	8,128,250
Santa Cruz	3,506,972	2,900,752
Shasta	4,025,223	3,766,717
Sierra	64,895	176,016
Siskiyou	1,620,514	1,896,246
Solano	2,720,428	4,931,944
Sonoma	1,655,326	1,521,314
Stanislaus	1,475,362	1,112,486
Sutter	95,438	74,905
Tehama	47,533	72,917
Trinity	1,053,442	323,123
Tulare	168,743	301,292
Tuolumne	854,080	783,508
Ventura	23,084,373	25,080,976
Yolo	617,418	365,176
Yuba	3,244,771	1,734,670
Totals	$408,738,434	$426,445,280

Total Mineral Production of California, by Years, Since 1887

The following tabulation gives the total value of mineral production of California by years since 1887, in which year compilation of such data by the State Mining Bureau (now Division of Mines) began. At the side of these figures have been placed the values of the most important metal and nonmetal items—gold and petroleum.

In the same period copper made an important growth beginning with 1897 following the entry of the Shasta County mines, and later Plumas County. Cement increased rapidly from 1902, while crushed rock, sand and gravel as a group paralleled the cement increase. Quicksilver has been up and down. Mineral water and salt have always been important items, but the values fluctuate. Borax has increased materially since 1896. War-time increases, 1915-1918, were shown by chromite, copper, lead, magnesite, manganese, silver, tungsten and zinc. Most of these later declined, though silver, structural materials and copper increased in 1920-1924. Natural gas showed a steady increase from 1907, and in 1928-1933 and 1934 its value was second only to petroleum. In 1939-1943 increases in output similar to those of 1915-1918 were shown by many mineral substances.

In 1929 the output of gold was the smallest of any year since its discovery, up to that time. From 1930 to 1940 there was a rapid increase in gold production, due in part to the raise in price per ounce, then from 1941 to 1943 the sharpest decline in the gold yield with the smallest annual production in 1943.

Mt. Diablo Quicksilver Mine near Clayton, Contra Costa County, California.
Photo by Walter W. Bradley

Total Mineral Production of California, by Years, Since 1887

Year	Total value of all minerals	Gold, value	Petroleum, value
1887	$19,785,868	$13,588,614	$1,357,144
1888	19,469,320	12,750,000	1,380,666
1889	16,681,731	11,212,913	368,048
1890	18,039,666	12,309,793	384,200
1891	18,872,413	12,728,869	401,264
1892	18,300,168	12,571,900	561,333
1893	18,811,261	12,422,811	608,092
1894	20,203,294	13,923,281	1,064,521
1895	22,844,663	15,334,317	1,000,235
1896	24,291,398	17,181,562	1,180,793
1897	25,142,441	15,871,401	1,918,269
1898	27,289,079	15,906,478	2,376,420
1899	29,313,460	15,336,031	2,660,793
1900	32,622,945	15,863,355	4,152,928
1901	34,355,981	16,989,044	2,961,102
1902	35,069,105	16,910,320	4,692,189
1903	37,759,040	16,471,264	7,313,271
1904	43,778,348	19,109,600	8,317,809
1905	43,069,227	19,197,043	9,007,320
1906	46,776,085	18,732,452	9,238,020
1907	55,697,949	16,727,928	16,783,943
1908	66,363,198	18,761,559	26,566,181
1909	82,972,209	20,237,870	32,398,187
1910	88,419,079	19,715,440	37,689,542
1911	87,497,879	19,738,908	40,552,088
1912	88,972,385	19,713,478	41,868,344
1913	98,644,639	20,406,958	48,578,014
1914	93,314,773	20,653,496	47,487,109
1915	96,663,369	22,442,296	43,503,837
1916	127,901,610	21,410,741	57,421,334
1917	161,202,962	20,087,504	86,976,209
1918	199,753,837	16,529,162	127,459,221
1919	195,830,002	16,695,955	142,610,563
1920	242,099,667	14,311,043	178,394,937
1921	268,157,472	15,704,822	203,138,225
1922	245,183,826	14,670,346	173,381,265
1923	344,024,678	13,379,013	242,731,309
1924	374,620,789	13,150,175	274,652,874
1925	434,519,660	13,065,330	330,609,829
1926	450,330,856	11,923,481	345,546,677
1927	366,781,394	11,671,018	260,735,498
1928	332,224,233	10,785,315	229,998,680
1929	432,248,228	8,526,703	321,366,863
1930	365,604,695	9,451,162	271,699,046
1931	215,964,420	10,814,162	141,835,723
1932	199,196,493	11,765,726	143,890,247
1933	206,489,058	15,683,075	143,063,972
1934	237,374,709	25,131,284	159,529,671
1935	263,404,317	31,165,050	179,335,311
1936	327,804,268	37,710,470	211,667,185
1937	361,515,951	41,110,230	237,845,872
1938	380,444,976	45,889,515	258,345,343
1939	352,462,564	50,234,240	226,358,856
1940	342,825,817	50,948,485	207,479,800
1941	374,326,228	49,307,755	218,838,171
1942	408,738,434	29,679,895	242,481,545
1943	426,445,280	5,191,480	289,323,406
Totals	$9,949,097,397	$1,098,801,118	$6,302,089,794

CHAPTER TWO

FUELS

Among the most important mineral products of California are its fuels. This subdivision includes coal, natural gas, and petroleum, the combined values of which make up practically 63 per cent of the State's entire mineral output for the year 1943.

There are deposits of peat known in several localities in California, small amounts of which are used as a fertilizer, and in stockfood preparations, but none has yet been recorded as utilized for fuel.

Comparison of values during 1942 and 1943 is shown in the following table:

Substance	1942		1943		Increase+ Decrease— Value
	Amount	Value	Amount	Value	
Coal*					
Natural gas	413,180,942 M cu. ft.	$25,698,502	443,219,847 M cu. ft.	$28,046,729	2,348,227+
Petroleum	247,491,289 bbls.	242,481,545	284,145,702 bbls.	289,323,406	46,841,861+
Total values		$268,179,597		$317,370,135	
Net increase					$49,190,088

* Concealed under 'Unapportioned.'

COAL

Bibliography: State Mineralogist Reports VII, XII-XV (inc.), XVII, XIX-XXVIII (inc.), XXVI, XXXI, XXXV, XXXVII, U. S. Geol. Surv., Bulletins 285, 316, 421, 431, 471, 581; Ann. Rept. 22, Pc. III.

The coal produced in California during 1943 is concealed under the 'Unapportioned' item so as not to reveal the output of a single producer in Trinity County. The 1941-1942 total production amounted to 190 net tons valued at $1,046 f.o.b. mine. This coal was consumed by the local market and also used on the property for camp purposes, power and forge, to carry on regular operations and development work.

Total Coal Production of California

The very considerable output of coal in the years previous to 1883 was almost entirely from the Mount Diablo district, Contra Costa County. Later the Tesla mine in Corral Hollow, Alameda County, was an important producer for a few years. Stone Canyon, Monterey County, was also an important producer for a short time, and there has been some coal shipped from properties in Amador, Fresno, Orange, Riverside, Siskiyou and Trinity counties. The following tabulation gives the annual tonnages and values, according to available records:

Coal Output and Value, by Years

Year	Tons	Value	Year	Tons	Value
1861	6,620	$38,065	1903	93,026	$265,383
1862	23,400	134,550	1904	79,062	376,494
1863	43,200	248,400	1905	46,500	144,500
1864	50,700	291,525	1906	24,850	61,600
1865	60,530	348,048	1907	23,734	55,849
1866	84,020	483,115	1908	18,496	55,503
1867	124,690	716,968	1909	49,389	216,913
1868	143,676	826,137	1910	11,033	23,484
1869	157,234	904,096	1911	11,047	18,297
1870	141,890	815,868	1912	14,484	39,092
1871	152,493	876,835	1913	25,198	85,809
1872	190,859	1,097,439	1914	11,859	28,806
1873	186,611	1,073,013	1915	10,299	26,662
1874	215,352	1,238,274	1916	4,037	7,030
1875	166,638	958,169	1917	3,527	7,691
1876	128,049	736,282	1918	6,343	16,149
1877	107,789	619,787	1919	2,983	8,203
1878	134,237	771,863	1920	2,078	5,450
1879	147,879	850,304	1921	12,467	63,578
1880	236,950	1,362,463	1922	27,020	135,100
1881	140,000	805,000	1923	1,010	5,090
1882	112,592	647,404	1924	1,425	8,800
1883	76,162	380,810	1925	730	3,880
1884	77,485	309,950	1926	1,100	5,000
1885	71,615	286,460	1927	200	1,100
1886	100,000	300,000	1928	782	4,542
1887	50,000	150,000	1929	450	2,476
1888	95,000	380,000	1930	10,885	59,858
1889	121,280	288,232	1931	12,551	77,607
1890	110,711	283,019	1932	9,508	36,468
1891	93,301	204,902	1933	2,612	11,367
1892	85,178	209,711	1934	13,549	52,720
1893	72,603	167,555	1935	8,049	32,745
1894	59,887	139,862	1936	370	1,815
1895	79,858	193,790	1937	269	2,933
1896	70,649	161,335	1938	275	1,650
1897	87,449	196,255	1939	1,750	8,100
1898	143,045	337,475	1940		
1899	160,941	420,109	1941	190	1,046
1900	176,956	535,531	1942		
1901	150,724	401,772	1943	*	*
1902	88,460	248,622			
			Totals	5,269,790	$23,397,785

The tonnages in the above table for the years 1861-1866 (incl.) are taken from the U. S. Geological Survey, "Mineral Resources of the U. S., 1910," p. 107. The values assigned for the years previous to 1883 are those given by W. A. Goodyear (Mineral Res., 1882, pp. 93-94), being an average of $5.75 per ton. From 1887 to date, the figures are those of the California State Mining Bureau.

* Annual details concealed under 'Unapportioned.'

NATURAL GAS

Bibliography: State Mineralogist Reports VII, X, XII, XIII, XIV, XXIX, XXXVII. Bulletins 3, 16, 19, 69, 73, 89, 118. Summary Oil and Gas Supervisor, Dec., 1919; Aug., 1922; Mar., 1923; Mar. and Apr., 1926.

Statistics on the production of natural gas in California are in a considerable degree difficult to arrive at, as much of it that is utilized directly at the wells for heating, lighting, and driving gas engines is not measured. Hence, it is necessary to approximate the output of many of the operators in the oil fields, estimated on the number of lights, and on the number and horsepower of gas engines and steam boilers thus operated. The figures here given are for gas utilized locally and also that sold for distribution to consumers; and we consider are not overestimated, particularly in the seven oil-producing counties. It must be remembered that some of our important oil fields are removed many miles from the site of any other industry, and that the gathering of small amounts of gas and transporting it for any considerable distance may

not always be profitable, nor is it often possible to have pipe-line facilities available to handle the gas accompanying the early gas production in newly developed fields. Wherever feasible, casing-head gas is used in driving gas engines for pumping and drilling, and in firing the boilers of steam-driven plants.

Production and Value

There is a rather wide variation in prices quoted for natural gas because a considerable part is used directly in the field for driving gas engines and firing boilers, and is therefore not measured nor sold. Such companies as have placed a valuation on the gas that was thus used in 1943 gave from 1.5¢ to 35¢ per 1000 cu. ft. at the well. From the totals shown in the tabulation following herein, the average value for all fields in 1942 works out at approximately 6.33¢ per M cu. ft. Approximately 7000 cu. ft. of gas is equal to one barrel of oil in heating value, and is so accounted for by many operators. In driving gas engines, about 4000 cu. ft. per 24 hr. are consumed by a 25-h.p. engine, and 63,700 cu. ft. per day for heating a 70-h.p. steam boiler, which figures have been utilized in compiling this report, in those cases where gas was not metered.

Utilized Production of Natural Gas in California, 1943

County	M cubic feet	Value
Fresno	48,944,169	$2,793,749
Kern	65,576,727	3,395,175
Kings	67,277,904	3,035,350
Los Angeles	54,480,234	3,894,849
Orange	15,705,073	1,079,728
Sacramento	62,766,484	4,767,138
San Joaquin	12,446,567	888,205
Santa Barbara	4,052,577	298,960
Solano	56,605,382	4,780,407
Ventura	43,133,041	2,247,380
Contra Costa, Humboldt, Madera, Mendocino, Stanislaus, Sutter, Tulare, Yolo*	12,331,689	865,788
Totals	443,219,847	$28,046,729

* Combined to conceal outputs of individual operators in each.

The above figures of 443,219,847 M cubic feet of natural gas, worth $28,046,729, were produced and utilized in California during 1943 as reported to the Division of Mines, as compared with 413,180,942 M cubic feet, worth $25,698,052, in 1942. For the first time since 1922 Los Angeles County did not lead in the production of natural gas utilized, as during the year it was passed in yield by Kings, Kern, Sacramento, and Solano counties and in value by Sacramento and Solano counties. An increase in production of natural gas utilized came from Kings, Sacramento, San Joaquin, Santa Barbara, Solano, and Ventura counties; with Fresno, Kern, Los Angeles, and Orange counties showing a decreased output.

Natural Gas Production in California Since 1888

The production of natural gas in California by years since 1888 is given in the following table. The first economic use of natural gas in California was from the famous courthouse well at Stockton, bored in 1854-1858. Beginning about 1883 and for several succeeding years, a number of gas wells were brought in around Stockton, and later at

Sacramento. Natural gas was known in a number of other localities, and occasionally utilized in a small way, notably at Kelseyville in Lake County, and in Humboldt County near Petrolia and Eureka, but there are no available authentic records of amounts or values previous to the year 1888. The most important developments in the commercial production of natural gas have been coincident with developments in the oil fields, by utilizing the casing-head gas as well as that from dry-gas wells, the most recent from the latter being in Solano and Sacramento counties.

Natural Gas Production in California Since 1888

Year	M cubic feet	Value	Year	M cubic feet	Value
1888	[a]12,000	$10,000	1916	28,134,365	$2,871,751
1889	[a]14,500	12,680	1917	44,343,020	2,964,922
1890	[a]41,250	33,000	1918	46,373,052	3,289,524
1891	[a]39,000	30,000	1919	52,173,503	4,041,217
1892	[a]75,000	55,000	1920	58,567,772	3,898,286
1893	[a]84,000	68,500	1921	67,043,797	4,704,678
1894	[a b]85,000	75,000	1922	103,628,027	6,990,030
1895	[a b]110,000	100,000	1923	240,405,397	15,661,433
1896	[a b]131,000	110,157	1924	209,021,596	15,153,140
1897	[a]71,300	62,657	1925	194,719,924	15,890,082
1898	[a]111,165	74,424	1926	214,549,477	19,465,347
1899	115,110	95,000	1927	224,686,940	20,447,294
1900	40,566	34,578	1928	260,887,116	22,260,947
1901	120,800	92,034	1929	400,129,201	29,675,546
1902	120,968	99,443	1930	315,513,952	24,559,840
1903	120,134	75,237	1931	344,959,920	16,690,695
1904	144,437	91,035	1932	284,168,872	16,272,061
1905	148,345	102,479	1933	271,743,544	15,403,514
1906	168,175	109,489	1934	263,207,517	14,408,761
1907	169,991	114,759	1935	302,447,193	17,680,661
1908	842,883	474,584	1936	298,922,708	18,585,970
1909	1,148,467	616,932	1937	323,883,714	19,859,865
1910	10,579,933	1,676,367	1938	332,358,439	22,310,755
1911	[a]5,000,000	491,859	1939	340,754,804	21,551,646
1912	[a]12,600,000	940,076	1940	352,871,945	20,618,983
1913	14,210,836	1,053,292	1941	378,173,737	21,522,445
1914	16,529,963	1,049,470	1942	413,180,942	25,698,052
1915	21,992,892	1,706,480	1943	443,219,847	28,046,729
			Totals	6,495,798,045	$459,978,736

[a] Quantity, in part, estimated, where values only were reported.
[b] Tabulations published previously to 1933 included values of CO_2, now shown under "Industrial Materials."

Gasoline from Natural Gas

More or less gas usually accompanies the petroleum in the oil fields, and such gas carries varying amounts of gasoline. A total of 84 plants were in operation in 1943 recovering gasoline by compression or absorption from this 'casing-head' gas. After the gasoline is extracted the remaining 'dry gas' so far as practicable is taken into pipe lines, by which it is distributed to consumers, both domestic and commercial.

Natural gas gasoline produced during 1943 was reported from all fields by 84 plants; a total of 528,771,009 gallons, valued at $21,968,165, as compared with 415,624,450 gallons, valued at $22,374,692, from 87 plants in 1942. In 1943 there was also a total of 90,723,022 gallons of liquefied petroleum gas, valued at $2,238,954, as compared with 68,930,472 as reported in 1942.

Natural Gas Gasoline and Liquefied Natural Gas for 1943

County	Natural Gas Gasoline		Liquefied Natural Gas	
	Gallons	Value	Gallons	Value
Fresno and Kings	94,182,374	$3,923,535	37,979,322	$911,504
Kern	74,937,876	2,790,064	27,382,039	684,551
Los Angeles	211,953,068	8,787,787	7,718,124	192,953
Orange	67,930,574	2,885,689	4,699,881	117,487
Santa Barbara	10,729,172	409,433	1,362,201	31,331
Ventura	69,037,945	3,170,757	11,581,455	301,118
Totals	528,771,009	$21,968,165	90,723,022	$2,238,954

The usual recoveries of gasoline from natural gas vary from ½ gal. to 3 gal. per 1000 cu. ft. of gas handled, the average being about 1 gal. per 1000 cu. ft. The U. S. Bureau of Mines Report by Knudsen[1] gives the average recovery for 1943 as 1.666 gallons per 1000 cu. ft. of gas treated. His figures show the following production by methods:

	M cubic feet natural gas treated	Gallons of gasoline recovered	Recovery gallons per M cubic feet
Oil absorption	349,946,759	583,180,890	1.666

PETROLEUM

Bibliography: State Mineralogist Reports IV, VII, X, XII, XIII, XXIX, XXXI, XXXIII-XXXV, XXXVII. Bulletins 3, 11, 16, 19, 31, 32, 63, 69, 73, 82, 84, 89, 118. Reports of Oil and Gas Supervisor 1915 to date (issued in monthly chapters since April, 1919, to June, 1929, and quarterly from then on.) U. S. Geol. Surv. Bulletins 213, 285, 309, 317, 321, 322, 340, 357, 398, 406, 431, 471, 541, 581, 603, 621, 623, 653, 691. Prof. Papers 116, 117. "American Petroleum; Supply and Demand"; Amer. Petr. Inst., 1925.

The crude petroleum produced in California during 1943 amounted to a total of 284,145,702 barrels, valued at $289,323,406 at the well. This was an increase in both amount and value as compared with the 1942 totals which were 247,491,289 barrels, worth $242,481,545. The totals of quantity are compiled from monthly reports filed by operators with the State Oil and Gas Supervisor.

The question of the value of the crude oil yield at the well is a difficult one to settle with exactitude principally because a large part of the output is not sold until after refining. The large refiners are also large producers of crude oil which they send direct from well to plant, hence much of the crude oil is not sold as such.

The value used in the statistical reports of the State Mining Bureau and the Division of Mines from 1914 to 1927 (inc.) was derived from an average of actual sales of crude oil of all grades in each field of the State and their average applied to the total yield of each respective field. The 1929-1933 values, used by the Division of Mines, were

[1] Knudsen, E. T., The Petroleum Situation in the Pacific Coast Territory (Monthly for 1943), U. S. Bureau of Mines.

obtained by using the production of crude oil by gravities produced in each field and applying an average of current price quotations for crude oil at the well as compiled by California Oil and Gas Association.

The values given to the 1934-1943 petroleum output by this department were obtained by using the average gravity oil for each field, to which was applied the average quotation for the year of said grade oil.

TABLE A

Production and Value of Crude Oil by Counties

County	1942		1943	
	Barrels	Value	Barrels	Value
Fresno	23,595,303	$21,206,580	37,869,219	$37,779,881
Kern	72,093,741	64,477,255	84,934,943	86,174,973
Kings	8,906,011	11,131,160	10,326,575	12,907,422
Los Angeles	87,248,536	90,620,837	87,983,756	90,193,521
Orange	24,122,716	25,459,382	26,441,558	26,325,466
Santa Barbara	13,267,311	9,407,096	16,285,344	13,523,527
Ventura	17,853,644	20,148,305	20,279,921	22,400,750
Other counties*	39,027	30,930	24,386	17,866
Totals	247,491,289	$242,481,545	284,145,702	$289,323,406

* Include San Bernardino, San Luis Obispo, Santa Clara, and Tulare counties.

The foregoing totals show an average price of $1.018 per barrel for the year 1943, as compared with $0.980 in 1942, $0.953 in 1941, $0.929 in 1940, $1.009 in 1939, $1.038 in 1938, $0.997 in 1937, $0.986 in 1936, and $0.870 in 1935.

TABLE B

Average Price of Oil per Barrel, by Counties, 1933-1943

County	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943
Fresno	$0.650	$0.941	$.1209	$1.255	$1.261	$1.173	$1.068	$0.963	$0.885	$0.998
Kern	.729	.729	.863	.886	.890	.826	.838	.878	0.894	1.015
Kings	1.085	1.045	1.338	1.390	1.390	1.430	1.262	1.217	1.250	1.250
Los Angeles	.990	.914	.974	.968	1.064	1.064	.941	1.008	1.039	1.025
Orange	.937	.898	.937	.945	.956	.952	.900	.901	1.055	0.996
San Luis Obispo										
Santa Barbara	.951	.924	1.143	1.083	.974	.830	.620	.644	0.709	0.830
Santa Clara										
Ventura	.944	.901	.971	1.050	1.102	1.090	1.087	1.102	1.129	1.105
State averages	$0.913	$0.970	$0.986	$0.997	$1.038	$1.009	$0.929	$0.953	$0.980	$1.018

For several years previous to 1919, the State average value per barrel at the well for crude oil as determined by the statistical returns was noted to practically coincide with the quotations during the same years for 23° gravity oil in the San Joaquin Valley fields. In 1919 and since, the average values have worked out at figures corresponding to quotations up to, in one year as high as 28° oil, due to the large yield of high-gravity oils from the new fields in the Los Angeles-Orange counties area.

TOTAL PETROLEUM PRODUCTION OF CALIFORNIA

The presence of oil seepages and springs in Los Angeles and Ventura counties was known and utilized in a small way early in the

history of California. Some also was shipped to refineries at San Francisco from Santa Barbara and Humboldt counties. In the light of present-day developments, the following reference to the previous year's production of oil and its future prospects as expressed by the San Francisco Bulletin of January 8, 1866, is strikingly prophetic even though skeptical:

"It is possible that the small quantity received (40,000 or 50,000 gallons in 1865) may be the forerunner of many millions which will, at some future time, lubricate the wheels of commerce and set a trade at work excelling in variety any that has thus far been known on this coast. At present, however, we admit to being a little skeptical about the assumption of the astute Professor Silliman that California will be found to have more oil in its soil than all the whales in the Pacific Ocean."

According to Hanks,[1] in 1874 production amounted to 36 bbl. per day from natural flows in pico Cañon (Newhall), and at Sulphur Mountain (Ventura County), the oil being of 32° gravity average.

"Work was commenced in Pico Canyon in 1875 by drilling three shallow wells with spring pole, all of which yielded oil at depths of from 90 to 250 feet. Actual work of development commenced with steam machinery in 1877." [2]

In 1877 Pico averaged 40-50 bbl. daily, and Ventura 80 bbl. daily. In 1878, there was some production (at 60 bbl. per day, for a time) from wells in Moody Gulch, near Los Gatos, Santa Clara County, the oil being of 46° Baumé.

The first wells in the Coalinga, Fresno County, and Summerland, Santa Barbara County, fields were drilled in 1890, but Coalinga did not make its influence felt conspicuously on the state's annual output until 1903. The Summerland yield never has been large. The Salt Lake field near Los Angeles began production in 1894 and in 1897 reached over a million barrels annually.

In the Kern County fields, the first well was drilled in Sunset in 1891, Midway in 1900, McKittrick in 1892, Kern River in 1899. The Sunset-Midway district attained a yield of over 4,000,000 bbl. in 1909, and over 20,000,000 bbl. in 1910. Kern River field produced over 3,000,000 bbl. in 1901.

The first well in the Santa Maria-Lompoc group, Santa Barbara County, was drilled in 1901, and the district advanced to a yield of over 3,000,000 bbl. annually in 1905.

The Whittier-Fullerton field in Los Angeles and Orange counties became an important factor in 1902. The Montebello field, Los Angeles County, was the conspicuous addition in 1918-1919; and Elk Hills, Kern County, with Huntington Beach and Richfield, Orange County, in 1920. In 1921, the new fields added were Long Beach and Santa Fe Springs, Los Angeles County; in 1922, Torrance field in Los Angeles County, and Wheeler Ridge field in Kern County; but the production from the large number of new wells started in these new Los Angeles County fields did not reach its peak until August and September, 1923. Dominguez (Compton) came in during 1923; followed by Rosecrans and Inglewood in 1924. Ventura recorded important additions to its producing area in 1925 and 1926. Seal Beach, Orange County, and Mt. Poso, Kern County, were the new fields added in 1926; Round Mountain, Kern County, and Rincon, Ventura County, were the new fields added in 1927; with Potrero in Los Angeles County, Elwood in Santa Barbara County and Kettleman Hills in Kings County in 1928.

[1] Hanks, Henry G., Report IV of State Mineralogist, p. 298, 1884.
[2] *Idem.* p. 301.

During 1929 Playa del Rey was added to the oil fields in Los Angeles County, and more recently a number of others have been added in Fresno, Los Angeles, Kern, and Santa Barbara.

The effect of the advent of these various fields to the producing column will be noted in the tabulation herewith, by years:

TABLE C

Total Petroleum Production in California

Year	Barrels	Value	Year	Barrels	Value
To and including 1875	[a]175,000	[b]$472,500	1910	77,697,568	$37,689,542
1876	12,000	30,000	1911	84,648,157	40,552,088
1877	13,000	29,250	1912	89,689,250	41,868,344
1878	15,227	30,454	1913	98,494,532	48,578,014
1879	19,858	39,716	1914	102,881,907	47,487,109
1880	40,552	60,828	1915	91,146,620	43,503,837
1881	99,862	124,828	1916	90,262,557	57,421,334
1882	128,636	257,272	1917	95,296,309	86,976,209
1883	142,857	285,714	1918	99,731,177	127,459,221
1884	262,000	655,000	1919	101,182,962	142,610,563
1885	325,000	750,750	1920	103,377,361	178,394,937
1886	[a]377,145	[b]870,205	1921	112,599,860	203,138,225
1887	678,572	1,357,144	1922	138,468,222	176,381,265
1888	690,333	1,380,666	1923	262,875,690	242,731,309
1889	303,220	368,048	1924	228,933,471	274,652,874
1890	307,360	384,200	1925	232,492,147	330,609,829
1891	323,600	401,264	1926	224,673,281	345,546,677
1892	385,049	561,333	1927	231,195,774	260,735,498
1893	470,179	608,092	1928	231,811,465	229,998,680
1894	783,078	1,064,521	1929	292,534,221	321,366,863
1895	1,245,339	1,000,235	1930	227,328,988	271,699,046
1896	1,257,780	1,180,793	1931	188,310,605	141,835,723
1897	1,911,569	1,918,269	1932	177,745,286	142,890,247
1898	2,249,088	2,376,420	1933	172,139,362	143,063,972
1899	2,677,875	2,660,793	1934	174,721,282	159,529,671
1900	4,319,950	4,152,928	1935	205,979,855	179,335,311
1901	7,710,315	2,961,102	1936	214,776,227	211,667,185
1902	14,356,910	4,692,189	1937	238,558,562	237,845,872
1903	24,340,839	7,313,271	1938	249,395,763	258,354,343
1904	29,736,003	8,317,809	1939	224,253,110	226,358,856
1905	34,275,701	9,007,820	1940	223,294,805	207,479,800
1906	32,624,000	9,238,020	1941	229,664,784	218,838,171
1907	40,311,171	16,783,943	1942	247,491,289	242,481,545
1908	48,306,910	26,566,181	1943	284,145,702	289,323,406
1909	58,191,723	32,398,187			
			Totals	6,356,965,852	$6,305,704,311

[a] U. S. G. S. Min. Res. of U. S., 1886, p. 440, for quantities to and including 1886.

[b] Values have been estimated for the years to and including 1886, after consulting a number of contemporaneous publications, including the Mining & Scientific Press, Reports of the State Mineralogist, and U. S. Reports. The figures for 1887 to date are from records of the State Mining Bureau.

Well Data:

The following table is compiled from monthly statements issued by the American Petroleum Institute:

TABLE D

Wells Operated, by Fields, 1943

Field	Wells producing Dec., 1942	Wells producing Dec., 1943	Wells completed during year	Daily initial output	Wells abandoned during year	Bbls. per well produced per day Dec., 1942	Bbls. per well produced per day Dec., 1943
GROUP No. 1—Antelope Hills	10	19	9	2,176	2	130.9	99.8
Arvin	12	2				36.3	22.5
Belridge, North	73	68	2	355	1	82.9	82.2
Belridge, South	303	495	175	8,307	5	14.7	17.1
Buena Vista Hills		822	43	2,277	10		17.4
Burrel		1	1	342	1		48.0
Canal	37	39				109.5	89.3
Canfield Ranch	1	1				54.0	21.0
Coalinga, East	459	582	85	8,384	12	37.3	35.9
Coalinga, Nose	213	217	1	591		248.5	281.9
Coalinga, West	658	714	44	1,872	9	8.8	9.3
Coles Levee	123	98	4	1,609		185.8	165.4
Dyer Creek	1	1				58.0	18.0
Edison	112	110	7	522	5	23.9	32.1
Elk Hills	212	232	20	5,113	1	60.5	66.9
Fruitvale	174	177	7	627	1	36.8	38.5
Greeley	78	84	5	3,516	1	144.4	166.0
Helm	6	7	4	1,579	4	99.3	107.4
Jacalitos	6	7	1	21		44.2	45.1
Kern Front		623	126	9,257	2		19.7
Kern River	2,353	1,967	2	12		6.9	4.6
Kettleman North Dome	260	266	7	1,945	7	165.0	157.5
Lanare		1	1	130	1		55.0
Lost Hills	369	382	11	341	2	10.1	9.3
McClung		1	1	265			275.0
McKittrick	270	292	23	985	11	17.1	15.9
Midway-Sunset	3,210	2,541	114	7,641	33	17.7	15.9
Mountain View	164	167			4	23.7	20.4
Mount Poso	413	456	44	3,197	7	53.2	51.0
Paloma	2	4	1	169		392.5	259.3
Pleasant Valley		6	6	5,288	1		216.2
Raisin City, East		9			2		94.0
Raisin City, West	9	5	5	1,668		119.4	145.2
Rio Bravo	96	100	1	1,000		138.1	148.2
Riverdale	12	25	21	4,785	2	68.4	108.4
Round Mountain	250	282	33	2,766	9	42.6	40.3
Shafter	2				1	36.0	
Strand, East	1	3	2	1,225	2	193.0	91.7
Strand, West	13	14	1	1,145		120.2	133.4
Tejon		2	2	173			33.5
Ten Section	120	117				172.6	128.8
Union Avenue	3	3				25.3	33.0
Wasco	13	13				137.9	209.4
Wheeler Ridge	34	34				7.7	7.6
GROUP No. 2—Aliso Canyon	18	18	3	2,703		106.2	125.4
Capitan	52	53			1	61.8	65.5
Del Valle	11	13	2	1,668		93.7	93.7
Elwood	54	52			2	70.4	124.5
Gato Ridge	18	25	6	1,439	1	210.2	183.1
Newhall Potrero	33	42	9	1,993		169.4	127.7
Oak Canyon	6	8	2	317	3	112.3	101.8
Padre Canyon	18	18				56.5	51.6
Rincon	68	73	3	182		49.6	42.3
San Martinez	10	16	6	1,553	2	105.1	89.7
San Miguelito	26	27	2	600		174.7	183.3
Santa Barbara	16	16				10.3	4.8
Santa Maria	262	291	15	9,537	7	38.6	40.2
Santa Maria Valley	230	253	22	7,109	3	37.0	40.5
Summerland	5	5				3.2	2.2
Ventura Avenue	402	437	24	23,733	1	105.7	99.8
Ventura-Newhall	524	513	12	950	25	9.0	8.9
Watsonville	7	7				3.6	3.6

TABLE D—Continued

Wells Operated, by Fields, 1943

Field	Wells producing Dec., 1942	Wells producing Dec., 1943	Wells completed during year	Daily initial output	Wells abandoned during year	Bbls. per well produced per day Dec., 1942	Bbls. per well produced per day Dec., 1943
Group No. 3—Brea Olinda	404	400	6	1,409		29.3	28.2
Buena Park	2	1			2	99.5	104.0
Coyote, East	128	133	8	642	1	48.6	41.1
Coyote, West	110	116	6	2,775		111.1	105.5
Dominguez	295	299	3	142	6	88.8	76.9
El Segundo	35	33			1	30.5	29.6
Huntington Beach	653	713	66	11,903	21	52.3	56.2
Inglewood	280	296	4	2,024		96.5	65.3
Lawndale	3	3				9.0	9.0
Long Beach	1,134	1,132			63	29.9	27.3
Los Angeles-Salt Lake	99	97			1	5.5	5.1
Montebello	354	341	18	1,539	31	32.8	32.3
Newport		2	2	37	1		10.5
Playa del Rey	118	110	1	37	6	24.2	22.3
Potrero	25	25				38.7	36.2
Richfield	307	311	4	227	2	24.3	22.7
Rosecrans	182	186	2	574	4	39.1	31.1
Santa Fe Springs	568	557			14	51.9	34.3
Seal Beach	133	132	1	850	2	61.7	55.4
Torrance	619	639	34	2,075	24	12.5	13.5
Turnbull Canyon	4	5	1	76		107.0	59.4
Whittier	159	160				7.0	6.4
Wilmington	1,100	1,166	71	13,606	1	86.0	82.3
Yorba Linda	5	11	8	1,319	2	112.6	63.8
Miscellaneous drilling					153		
Group No. 4—Gas Fields:							
Bowerbank		2			1		
Buena Vista Hills		13			1		
Buena Vista Lake	2	2					
Buttonwillow	18	14					
Chowchilla							
Colusa			1	Gas			
Coles Levee		4					
Delano	19	26					
Elk Hills		2					
El Segundo		3	1	Gas			
Fairfield Knolls	1						
Firebaugh			1	Gas			
Goleta	4	6					
Lodi			5	Gas			
Marysville Buttes	4	5	1	Gas	4		
McDonald Island	7	6					
Mendota		1	4	Gas			
Mount Poso			1	Gas			
Rio Vista	52	63	10	Gas	1		
Roberts Island		1					
Semi-Tropic	3	11		Gas	3		
Thornton			3	Gas	2		
Tompkins Hill	2	2					
Tracy	3	1					
Vernalis		2			1		
Totals	18,664	19,852	1,183	170,302	531	36.7	40.2

Specific Gravity of Oils Produced

The proportion of heavy and light oil produced in the various fields is shown in Table E, following, for which we are indebted to the Standard Oil Company. Specific gravities in California range from 8° Baumé in the Casmalia field, Santa Barbara County, to 60° in Greeley field, Kern County.

California crude oils are all essentially of asphalt base, with a few notable exceptions. In the following localities are wells yielding crudes

containing both asphalt and paraffine constituents: Oil City field, Coalinga; a few deep wells in East Side field, Coalinga; a considerable part of the Ventura County field; Western Minerals area, south of Maricopa; Wheeler Ridge, Kern County.

TABLE E

Production of Light and Heavy Oils, by Fields, for 1943

Field	Under 20° (barrels)	20° and above (barrels)	Total (barrels)
San Joaquin Valley—			
Antelope Hills	759,398		759,398
Arvin		16,109	16,109
Belridge North	6,290	2,128,528	2,134,818
Belridge South	2,391,392	59,664	2,451,056
Burrel		7,128	7,128
Canal		1,443,603	1,443,603
Canfield Ranch		15,539	15,539
Coalinga, East and West	2,994,853	6,334,567	9,329,420
Coalinga, Eocene		22,064,731	22,064,731
Coles Levee		5,905,236	5,905,236
Devil's Den	14,197		14,197
Edison	548,910	350,826	899,736
Elk Hills	825,833	4,548,171	5,374,004
Fruitvale	428,197	2,189,400	2,617,597
Grapevine		1,885	1,885
Greeley		4,839,714	4,839,714
Helm		167,495	167,495
Jacalitos		118,263	118,263
Kern River (including Kern Front)	5,980,498		5,980,498
Kettleman Hills, N. D.		15,299,274	15,299,274
Lanare		13,671	13,671
Lost Hills	759,755	567,363	1,327,118
McClung		17,869	17,869
McKittrick	1,688,992	4,450	1,693,442
Midway Sunset (including Buena Vista Hills)	9,273,678	10,914,051	20,187,729
Mount Poso	8,391,256		8,391,256
Mt. View	8,287	1,408,589	1,416,876
Paloma		297,510	297,510
Pleasant Valley		235,312	235,312
Poso Creek	1,286,210		1,286,210
Raisin City		381,706	381,706
Rio Bravo		5,430,993	5,430,993
Riverdale		592,733	592,733
Round Mountain (including Coffee Canon)	3,771,836	356,397	4,128,233
Shafter		12,340	12,340
Strand—East and West		689,148	689,148
Ten Sections		6,557,725	6,557,725
Terra Bella	390		390
Union Avenue	40,213		40,213
Wasco		786,817	786,817
Wheeler Ridge		97,720	97,720
Totals	39,170,185	93,854,527	133,024,712
Coastal			
Aliso Canon		755,428	755,428
Arroyo Grande	9,868		9,868
Capitan		1,176,581	1,176,581
Del Valle		925,828	925,828
Elwood		1,667,960	1,667,960
Gato Ridge	1,292,253		1,292,253
Lompoc	477,132	128,377	605,509
Newhall	838	22,109	22,947
Newhall Potrero		1,953,662	1,953,662
Oak Canon		284,249	284,249
Padre Canon		343,346	343,346
Rincon		1,210,275	1,210,275
San Miguelito		1,614,381	1,614,381
Santa Barbara Mesa	42,300		42,300
Santa Maria	1,693,637	1,471,336	3,164,973
Santa Maria Valley	8,295,586		8,295,586
Summerland	3,549		3,549
Ventura Avenue		15,460,243	15,460,243
Ventura County	220,109	1,438,834	1,658,943
Watsonville	9,125		9,125
Total, Coastal	12,044,397	28,452,609	40,497,006

TABLE E—Continued

Production of Light and Heavy Oils, by Fields, for 1943

Field	Under 20° (barrels)	20° and above (barrels)	Total (barrels)
Southern California—			
Brea Olinda	291,161	4,239,596	4,530,757
Buena Park		48,392	48,392
Chino		1,420	1,420
Coyote—East	74,091	1,999,117	2,073,208
Coyote—West		4,427,198	4,427,198
Dominguez		9,118,576	9,118,576
El Segundo	120,762	240,857	361,619
Huntington Beach	712,263	12,516,667	13,228,930
Inglewood	467,840	6,444,770	6,912,610
Lawndale		9,984	9,984
Long Beach	175,228	11,371,116	11,546,344
Los Angeles	63,370		63,370
Montebello	10,194	3,948,133	3,958,327
Newport Beach	3,584		3,584
Playa del Rey	97,312	874,367	971,679
Potrero		336,690	336,690
Richfield	607,341	2,076,170	2,683,511
Rosecrans		2,208,162	2,208,162
Salt Lake	117,941		117,941
Santa Fe Springs		7,309,510	7,309,510
Seal Beach		2,866,244	2,866,244
Torrance (including Vesta and Hermosa)	1,616,229	1,246,213	2,862,442
Turnbull Canon	551	121,375	121,926
Whittier	284,580	92,175	376,755
Wilmington	8,941,303	25,404,408	34,345,711
Totals, Southern California	13,583,750	96,901,140	110,484,890
Grand totals	64,798,332	219,208,276	284,006,608

Oil in "Storage"

Field, refinery, pipe-line and tank-farm stocks of crude and refined products in the Pacific Coast [1] territory totaled 96,504,698 barrels on December 31, 1943, as compared with 125,465,486 barrels on December 31, 1942, with a total decrease in stock from the preceding year of 28,960,788 barrels. Table F gives a breakdown of stocks as of December 31, 1942 compared with December 31, 1943.

TABLE F

	Dec. 31, 1942 (barrels)	Dec. 31, 1943 (barrels)
1. Gasoline-bearing crude	32,634,698	29,592,409
2. Non-gasoline-bearing crude	10,823,494	7,488,474
3. Unblended natural gasoline	1,036,643	1,371,845
4. Gasoline (exc. distributing and service stations)	14,949,595	11,543,307
5. Naphtha distillates	[a]3,583,468	[a]3,842,453
6. Gas Oil and diesel oil	12,234,123	10,722,872
7. Fuel oil residuum	44,306,730	26,557,502
8. All other stocks	[b]5,896,735	[b]5,385,836
Totals	125,465,486	96,504,698
[a] Estimated amount of unfinished gasoline in item No. 5	3,197,463	3,263,412
[b] Coke included in item No. 8	111,317	66,034

Utilization of California Crude Oil

Most of the crude oil produced in California is sent to storage reservoirs at tank farms near the oil fields and from these reservoirs by pipe

[1] American Petroleum Institute: Summary of California Oilfield Operations for December, 1943.

lines to the refineries, the larger ones of which are located in the vicinity of Los Angeles and on San Francisco Bay.

During 1943 the crude oil consumed in California according to the U. S. Bureau of Mines[1] was 257,228,000 barrels sent to stills at the refineries; 6,612,000 barrels used for cracking; 20,785,000 barrels either consumed as fuel or added to residuum; there were no shipments of crude oil out of the state as such; also stocks were depleted by 4,136,000 barrels from 1942, compared with 1942 when 219,248,000 barrels were sent to the stills; 10,916,000 barrels were used for cracking; 16,895,000 barrels either were used as fuel or added to residuum; and stocks were depleted by 2,135,000 barrels, from the previous year.

The production of petroleum products during 1942 and 1943 is shown in Table G:

TABLE G

Commodity	1942 Amount in barrels	1943 Amount in barrels
Crude petroleum to stills	219,248,000	257,228 000
Crude used for cracking	10,916,000	6,612,000
Natural gas gasoline	12,989,000	13,886,000
Gasoline and naphtha distillates	86,476,000	92,449,000
Kerosene	2,776,000	4,533,000
Lubricating oil and greases	2,905,000	3,694,000
Gas oil and diesel oil	31,733,000	39,193,000
Residuum and non-gasoline-bearing crude (fuel oil)[a]	95,980,000	114,928,000
Asphalt and road oil	11,915,000	8,992,000
Totals[b]	243,153,000	277,726,000
[a] Includes heavy non-gasoline crude oil	16,895,000	20,785,000
[b] Totals of crude oil and natural gasoline.		

Operating Data

The following tabulation (Table H) is compiled from data published by the State Division of Oil and Gas,[2] semiannually, and here combined to show the entire year's operations for all fields. The districts are the geographical subdivisions as administered by that Division and which are outlined on the accompanying map.

It will be noted that the state average yield of oil per-well-per-day was 81.8 barrels for the first six months of 1943 and 79.6 barrels for the second. This is somewhat higher than the figures 40.2 barrels average for December derived from American Petroleum Institute data as shown in Table D, on a previous page, due in part at least, to the fact that the latter is on a full-time basis, whereas the Division's figures allow for shut-down time.

[1] Knudsen, E. T., The petroleum situation in the Pacific Coast territory (monthly) 1943, U. S. Bureau of Mines.

[2] Summary of Operations—California Oil Fields; Division of Oil and Gas, Fifteenth Annual Report of State Oil and Gas Supervisor, Vol. 29, No. 1, Jan.-June, 1943, and No. 2, July-Dec., 1943.

Proved Oil Land

The total proved oil land and natural gas land in California as of December 31, 1943 was 221,752 acres; an increase of 9,947 acres during the year 1943, according to data furnished by the Division of Oil and Gas.[1] The acreage as of December 31, 1942 and December 31, 1943, by counties, is given in the following Table I:

TABLE I

Proved Oil and Natural Gas Land

County	*Acres Dec. 31, 1942*	*Acres Dec. 31, 1943*
Colusa	------	20
Contra Costa	250	730
Fresno	25,028	27,148
Glenn	------	40
Humboldt	480	480
Imperial*	200	160
Kern	100,620	104,255
Kings	8,224	8,104
Los Angeles	18,862	19,581
Madera	------	500
Orange	6,693	7,348
Sacramento	11,380	11,600
San Bernardino	10	10
San Joaquin	1,370	2,040
San Luis Obispo**	360	280
Santa Barbara	16,463	17,078
Santa Clara	80	90
Solano	8,620	8,620
Stanislaus	------	50
Sutter	520	840
Tulare	5,000	5,000
Ventura	7,645	7,538
Yolo	------	240
Totals	211,805	221,752

* Carbon dioxide gas only.

** Includes 80 acres in District No. 4.

[1] Summary of Operations—California Oil Fields; Division of Oil and Gas, Fifteenth Annual Report of State Oil and Gas Supervisor, Vol. 28, No. 2, July-Dec., 1942.

TABLE H

Production Statistics and Operating Data of California Oil Fields—1943

Field	January 1 to June 30				July 1 to December 31				Cumulative production of oil (bbls.) to end 1943	[1]Proved acreage as of Dec. 31, 1943
	Average number of producing wells—actual	Oil (bbls.)	Production per well per day (bbls.)	Percentage of time wells produced	Average number of producing wells—actual	Oil (bbls.)	Production per well per day (bbls.)	Percentage of time wells produced		
Dist. 1.—Aliso Canyon	19	367,605	230.5	46.4	18	387,825	245.8	47.6	3,179,024	210
Beverly Hills	2	20,118	58.7	94.8	2	17,150	51.5	90.5	4,466,294	15
Brea-Olinda	402	2,157,844	32.3	91.7	401	2,136,343	30.5	94.8	176,648,766	1,318
Coyote, East	157	1,242,182	46.5	94.0	162	1,214,952	42.5	96.0	49,637,397	1,075
Coyote, West	143	2,215,938	97.8	87.5	156	2,212,025	88.9	86.7	133,625,582	928
Del Valle	21	451,867	131.5	90.4	24	473,354	121.4	88.3	2,167,339	330
Dominguez	291	4,706,432	92.5	96.6	299	4,420,229	82.0	98.0	147,748,001	1,285
El Segundo	35	183,959	30.9	94.1	35	180,651	29.8	94.1	10,953,097	435
Huntington Beach	690	6,189,323	52.6	94.2	723	7,007,575	56.1	93.8	325,986,394	2,935
Inglewood	279	3,456,710	75.1	91.2	282	3,454,052	71.5	93.1	139,986,314	850
Lawndale	3	5,072	10.2	91.2	3	5,002	9.7	93.7	1,124,636	15
Long Beach	1,193	5,895,208	28.3	96.6	1,170	5,688,539	27.2	97.2	685,954,860	1,240
Los Angeles City	87	31,709	2.1	97.4	90	36,178	2.3	96.3	54,320,363	250
Montebello	352	1,984,279	33.1	94.2	346	1,975,228	32.9	94.4	135,036,003	1,415
Newhall	11	11,855	6.8	88.0	14	12,506	6.7	72.6	1,885,457	360
Newhall-Potrero	32	976,950	207.9	81.1	35	986,349	183.3	83.5	5,579,871	445
Oak Canyon	8	139,902	111.7	86.5	8	147,550	111.9	89.6	486,024	100
Playa del Rey	125	504,416	23.5	94.7	123	466,546	21.9	94.3	47,985,443	475
Potrero	24	167,400	40.0	96.3	24	166,630	39.2	96.4	4,770,611	140
Richfield	307	1,296,200	24.1	96.7	304	1,258,358	23.3	96.6	[3]100,404,377	1,210
Rosecrans	183	1,143,362	35.5	97.2	184	1,061,376	33.0	95.0	53,466,114	695
Salt Lake	8	41,284	29.8	95.8	8	40,520	29.7	92.6	7,609,222	18
Santa Fe Springs	566	3,702,012	37.6	96.1	559	3,592,573	36.1	96.7	492,715,347	975
Seal Beach	132	1,470,123	63.8	96.5	132	1,394,358	59.5	96.5	95,640,572	395
Torrance	619	1,404,699	13.2	94.9	629	1,470,114	13.4	94.6	[5]108,846,787	4,590
[1]Turnbull	5	61,040	83.3	81.0	6	61,339	60.9	91.3	244,754	75
Whittier	159	185,050	6.9	93.4	159	189,254	6.8	95.3	19,759,817	570
Wilmington	1,102	17,020,897	88.7	96.2	1,134	17,277,457	86.0	96.2	[5]208,533,064	4,530
Los Angeles County	2	3,026	9.3	89.8	2	3,224	13.2	66.3	[3]79,862	10
Orange County	2	29,091	105.4	76.2	2	22,504	63.4	96.5	90,256	40
San Bernardino County	1	800	10.1	43.6	1	75	7.5	5.4	16,256	10
Totals	6,960	57,066,353	47.8	94.9	7,035	57,359,836	46.5	95.2	3,018,947,904	26,939

Dist 2.—Bardsdale	153	181,260	7.1	91.7	151	187,702	7.1	95.2	14,702,903	775
Ojai	52	18,345	2.6	74.1	54	19,242	2.5	78.8	3,234,396	410
Piru	83	201,266	16.0	83.6	80	204,611	16.7	83.2	8,902,315	705
Rincon	122	1,546,527	79.2	88.5	122	1,623,515	80.2	90.2	27,446,315	883
Santa Paula	44	11,975	2.6	58.5	44	12,164	2.4	62.1	2,232,236	455
Sespe	21	36,142	14.5	65.6	23	35,282	11.6	72.0	3,107,395	390
Simi	49	13,677	1.6	94.0	53	13,972	1.5	93.6	2,207,342	620
South Mountain	91	264,433	17.0	94.6	93	261,171	16.0	95.3	23,643,327	745
Ventura	405	7,537,109	114.4	89.9	431	7,919,478	111.6	89.5	267,812,056	2,415
Ventura County	2	101,708	281.0	100.0	2	90,342	245.5	100.0	792,765	140
Totals	1,022	9,912,442	61.3	87.4	1,053	10,367,479	60.4	88.6	354,081,050	7,538
Dist. 3—Arroyo Grande	6	7,518	6.8	96.1	3	7,415	15.4	87.0	1,252,968	200
Capitan	53	565,707	63.3	93.1	54	612,814	64.4	95.8	7,676,682	220
Casmalia	6	55,407	89.2	57.2	10	94,682	74.6	69.0	14,823,062	740
Cat Canyon	56	1,289,881	153.7	82.8	66	1,574,230	148.5	87.3	30,175,630	2,190
Elwood	62	715,433	77.5	82.2	61	976,949	101.3	85.8	70,916,947	480
La Goleta Gas	[26]				[26]	0			283	400
Lompoc	28	309,598	69.3	88.2	30	292,481	57.3	92.4	11,212,542	3,060
Mesa	17	22,809	8.2	90.2	16	17,509	6.9	85.9	3,449,342	38
Moody Gulch	1	128	2.2	32.6	1	352	6.8	28.3	59,707	10
Santa Maria	194	739,231	23.5	89.7	198	732,902	21.6	93.2	100,099,100	4,420
Santa Maria Valley	241	3,983,033	111.8	81.7	250	4,299,910	111.2	84.1	37,980,867	5,520
Sargent	8	4,198	4.0	71.8	8	3,750	3.5	72.3	766,364	80
Summerland	3	2,113	4.0	97.4	2	1,655	4.8	94.6	3,177,950	10
Totals	675	7,695,056	73.8	85.3	699	8,613,649	76.1	88.0	281,591,444	17,368
Dist. 4—Antelope Hills	17	380,566	135.8	91.1	18	376,543	125.7	90.4	853,294	195
Belridge, North	67	1,026,874	127.0	66.7	64	1,111,938	130.5	72.4	46,444,395	1,780
Belridge, South	332	1,031,992	19.4	88.6	422	1,354,128	19.3	90.2	27,922,760	4,510
Bowerbank Gas	[22]				[22]	0			0	1,360
Buttonwillow Gas	[216]				[217]	0			0	1,240
Canal	35	773,751	147.6	82.7	36	672,493	138.8	73.1	9,089,585	780
Canfield Ranch	1	8,729	51.0	94.5	1	6,810	39.1	94.6	116,610	20
Coles Levee, North	67	2,430,408	238.0	84.2	72	2,366,622	207.1	86.3	13,802,663	2,390
Coles Levee, North	[21]				[21]	0			0	
Coles Levee, South	33	539,022	134.2	67.3	26	568,059	130.3	91.1	6,370,590	2,750
Coles Levee, South	[22]				[23]	0			0	
Devils Den	5	1,763	3.9	49.8	7	3,200	5.5	45.1	90,893	120
Edison	108	442,903	24.4	92.7	110	469,957	25.1	92.4	[310,574,614	1,380
Elk Hills	214	2,499,229	69.6	92.7	229	2,874,213	71.7	95.2	166,861,433	9,480
Elk Hills	[21]				[21]	0			0	
Fruitvale	169	1,252,209	45.2	90.7	172	1,332,463	46.9	89.8	29,758,694	1,940
Greeley	79	2,277,204	209.6	76.0	82	2,561,355	199.9	84.9	13,879,862	1,860

TABLE H—Continued
Production Statistics and Operating Data of California Oil Fields—1943

Field	January 1 to June 30				July 1 to December 31				Cumulative production of oil (bbls.) to end 1943	Proved acreage as of Dec. 31, 1943
	Average number of producing wells—actual	Oil (bbls.)	Production per well per day (bbls.)	Percentage of time wells produced	Average number of producing wells—actual	Oil (bbls.)	Production per well per day (bbls.)	Percentage of time wells produced		
DIST. 4—Continued										
Kern Front	466	1,269,780	15.7	95.7	502	1,407,898	15.9	95.6	52,839,563	3,690
Kern River	1,955	1,465,867	4.4	94.4	2,050	1,633,645	4.6	94.9	281,476,904	7,125
Lost Hills	370	673,723	10.4	96.3	374	656,039	10.0	95.8	54,048,010	2,355
McKittrick-Temblor	275	873,567	18.3	95.9	280	877,877	17.6	96.4	[3]95,790,294	1,810
Midway-Sunset	3,310	10,119,571	18.1	93.2	3,496	10,172,420	17.4	90.8	[3]950,882,250	42,580
Midway-Sunset	[2]15				[2]4	0			0	
Mt. Poso	418	4,055,820	57.4	93.4	439	4,371,664	56.1	96.5	70,869,097	2,755
Mountain View	157	746,763	28.3	92.7	152	652,693	25.3	92.1	43,788,553	1,740
Paloma	2	131,223	717.1	50.6	2	166,956	421.6	71.7	779,639	2,000
Paloma	[2]2				[2]1	0			0	
Poso Creek	115	685,667	37.1	88.9	147	842,608	34.2	91.0	[3]6,225,144	1,370
Rio Bravo	98	2,658,692	235.9	63.5	99	2,784,429	172.3	88.7	21,747,067	1,870
Round Mountain	260	2,040,316	46.3	93.7	275	2,113,270	43.5	96.0	39,302,476	2,030
Semitropic Gas	[2]11				[2]10	0			0	1,600
[6]Strand	15	294,707	155.0	76.5	16	377,443	146.8	87.4	2,333,441	260
Ten Section	115	3,509,943	179.8	93.8	116	3,047,781	154.4	92.5	26,954,676	1,910
Trico Gas	[2]17				[2]21	0			0	5,840
Wasco	13	339,434	182.5	79.0	13	443,052	200.7	92.3	2,957,102	260
Wheeler Ridge	34	45,942	7.8	95.4	34	48,115	7.8	98.5	4,137,671	275
Kern County—										
Dyer Creek Area	1	6,087	35.4	95.0	1	2,822	16.2	94.6	27,431	10
Grapevine Area	1	1,934	11.1	96.7	1	57	11.4	2.7	102,308	0
McClung Area					1	18,798	164.9	62.0	18,798	10
Quinn Ranch Area	1	100	20.0	2.8	1	400	40.0	5.4	500	0
Shafter Area	2	9,557	26.5	99.4	2	4,300	22.9	51.1	48,705	10
Shale Hills Area	0	0	0	0	0	0	0.0	0.0	1,463	10
Tejon Area					1	3,552	48.0	40.2	3,552	20
Tulare County—Terra Bella Area	1	130	2.1	34.3	1	20	2.0	5.4	[3]23,016	0
Totals	8,736	41,611,473	28.4	92.6	9,242	43,323,620	27.5	92.6	1,980,123,053	109,335

Dist. 5—Coalinga	1,211	4,426,157	21.2	95.2	1,270	4,894,015	21.9	95.7	3,598,717	14,687
East Coalinga Extension	213	10,764,817	320.1	87.2	212	11,284,939	305.4	94.7	1,056,699	4,065
Eureka Gas	[2]2				[3]3	0				480
Helm	6	57,438	94.5	56.0	8	109,480	107.0	69.5	5,856	1,760
Jacalitos	7	62,760	57.0	87.0	7	55,837	45.7	95.0	444	220
Kettleman Middle Dome	0	0	0	0					548,562	150
Kettleman North Dome	257	7,734,350	197.1	84.4	260	7,565,250	179.4	88.1	3,107,266	12,690
Marysville Buttes Gas	[2]3				[4]4	0				840
McDonald Island Gas	[2]5				[2]5	0				1,060
Pleasant Valley	1	58,116	461.2	69.6	4	176,597	333.2	73.6	1,318	120
Raisin City	10	155,241	104.2	82.3	11	226,150	125.5	89.0	56,236	530
Rio Vista Gas	[2]51				[2]57	0				20,730
Riverdale	13	144,978	121.0	50.9	26	456,718	121.3	78.7	16,316	1,110
Tracy Gas	[2]3				[2]1	0				310
Vernalis	[2]2				[2]2	0				100
Colusa County—Colusa Area					0	0				20
Fresno County	1	2,589	68.1	21.0	2	18,208	82.4	60.1	11	40
Glenn County—Willows Area	0				0	0				40
Kings County	1	911	16.0	31.5	1	1,243	32.7	20.7	6	30
Madera County	[2]1				[2]1	0				500
Sacramento County—Thornton Area					[2]1	0				220
San Joaquin County	[2]1				[2]2	0				620
Sonoma County—Petaluma Area	0								3,304	20
Yolo County—Fairfield Knolls Area	[2]1				[2]1	0				240
Totals	1,720	23,407,357	81.8	91.9	1,801	24,788,437	79.6	94.0	7,842,869	60,412
Grand totals	19,113	139,692,681			19,830	144,453,021			188,274,362	221,592
Dist. 1—Imperial Carbon Dioxide Gas	13				13					[7]160

[1] Formerly included in Los Angeles County figures.
[2] Gas wells omitted from totals.
[3] Corrected figure.
[4] Adjustment made to correct errors in summarizing production for 1924, 1927 and 1928.
[5] 57,948 bbl. transferred from Torrance to Wilmington, due to change in boundary line.
[6] Includes East Strand Area formerly carried under Kern County.
[7] Revised figures based on more complete data on field development.

CHAPTER THREE

METALS

Bibliography: Reports of State Mineralogist I-XXXIX (inc.). Bulletins 5, 6, 18, 23, 27, 36, 50, 57, 76, 78, 85, 92, 95, 108. Spurr and Wormser, "Marketing of Metals and Minerals." See also under each metal.

The value of the metals produced in California during 1943 amounted to a total of $27,703,118, as compared with $46,185,885 in 1942. For the first time in this State, the value of the gold output has been exceeded by other metals, namely quicksilver and tungsten, other metals in order of their value for the year were iron ore, chromite, copper, manganese ore, lead, molybdenum ore, zinc, silver, platinum group metals, and titanium ore.

A comparison of the 1942 output with that of 1943 is afforded by the following table:

Substance	1942		1943		Increase+ Decrease— Value
	Amount	Value	Amount	Value	
Copper	2,138,149 lbs.	$258,716	17,172,440 lbs.	$2,232,417	1,943,701+
Gold	847,997 fine ozs.	29,679,895	148,328 fine ozs.	5,191,480	24,488,415—
Iron ore	99,092 tons	371,562	907,458 tons	2,341,827	1,970,265+
Lead	10,329,176 lbs.	692,054	11,811,034 lbs.	885,827	193,773+
Quicksilver	30,087 flasks	5,553,357	33,948 flasks	6,177,159	623,802+
Silver	1,450,440 fine ozs.	1,031,424	609,075 fine ozs.	433,120	598,304—
Tungsten ore	231,201 units	5,586,770	254,118 units	5,910,745	323,975+
Zinc	1,275,795 lbs.	118,659	5,170,627 lbs.	558,427	439,768+
Unapportioned*	[a]	2,893,448	[b]	3,972,116	1,078,668+
Total values		$46,185,885		$27,703,118	
Net decrease					$18,482,767

[a] Includes antimony, chromite, manganese ore, molybdenum ore, platinum group metals, and titanium ore.
[b] Includes chromite, manganese ore, molybdenum ore, platinum group metals, and titanium ore.

ALUMINUM

Bibliography: Report XVIII, p. 198, XXXVII. Bulletins 38, 67. U. S. Geol. Surv., Min. Res. of U. S.

To date there has been no commercial production of aluminum ore in California. Only a single authenticated occurrence of bauxite has thus far been noted in this State, being in Riverside County southeast of Corona, but as yet undeveloped.

Minerals containing aluminum are abundant, the most widely distributed being the clays. There are only two, however, thus far of consequence commercially, in the production of the metal; bauxite (to which may be added the related hydrated oxides, hydrargillite and diaspore) and cryolite. Cryolite is found in commercial quantities only in south Greenland, and was formerly the only ore of aluminum used, being still employed as a flux in the extraction of the metal. Bauxite has been for some years the most important source of aluminum and its salts. Its color varies from gray to red, according to the amount of iron present, the composition ranging usually between the following limits: Al_2O_3, 30%–60%; Fe_2O_3, 3%–25%; SiO_2, 0.5%–20%; TiO_2, 0.0–10%.

Besides its reduction to the metal bauxite is also utilized in the manufacture of aluminum salts, refractories, alundum (fused alumina) for use as an abrasive, and in the refining of oil.

ANTIMONY

Bibliography: State Mineralogist Reports VIII, X, XII-XV (inc), XVII, XXII, XXIII, XXV-XXVII (inc.), XXXI, XXXIV, XXXVI. Bulletins 38, 91.

During 1943 in California there were no shipments of antimony reported. In 1942 there were shipments of antimony ore from properties in Inyo, Kern, San Benito, and San Bernardino counties. The annual details are concealed under the 'Unapportioned' item as provided for in the regulations of the Office of War Information, but will be made available at some later date. The 1942 output was the largest since 1917.

Pure antimony metal and manufactured antimony compounds are of considerable importance as pigments in the ceramic industry. The most important use of the metal, commercially, is in various alloys, particularly type-metal (with tin and lead), babbitt (with tin and copper), and britannia metal (with tin and copper). An alloy of 6% antimony and 94% lead is being extensively used in making battery plates for storage batteries for automobiles, airplanes and radio apparatus.

Present New York quotations (Aug. 10, 1944) are around 16.5¢ per pound for Chinese (duty paid) and 15.839¢ for domestic antimony.

Antimony Production in California, by Years

The production of antimony ore in California by years since 1887 has been as follows:

Year	Tons	Value	Year	Tons	Value
1887	75	$15,500	1916	1,015	$64,793
1888	100	20,000	1917	158	18,786
1889			1918		
1893	50	2,250	1925	*26	770
1894	150	6,000	1926		
1895	33	1,485	1927	20	590
1896	17	2,320	1928	20	761
1897	20	3,500	1929		
1898	40	1,200	1939	150	4,552
1899	75	13,500	1940	*28	7,958
1900	70	5,700	1941	*10	2,537
1901	50	8,350	1942	*	*
1902	510	35,666	1943		
			Totals	2,617	$216,227

* Annual details concealed under 'Unapportioned.'
a Beginning 1940, amount of recoverable metal; before, tons of antimony ore shipped.

ARSENIC

Bibliography: Reports XVIII, XXIII, XXV, XXX, XXXIII, XXXV. Bulletin 67. U. S. G. S., Min. Res. of U. S.

Arsenic is found in a number of localities in California in the mineral arsenopyrite (FeAsS), which is frequently gold bearing; and in scorodite ($FeAsO_4+2H_2O$), an oxidation product of arsenopyrite. The occurrence of realgar (AsS) has also been noted.

Except for a small output in 1924, there has been no commercial recovery of arsenic from California ores. There having been only a single operator, the figures are concealed under the 'Unapportioned' item.

BERYLLIUM

Bibliography: State Mineralogist Report XXVII, XXXV, XXXVI, Eng. & Min. Jour.-Press, Vol. 118, No. 8, p. 285, Aug. 23, 1924. U. S. Bureau of Mines Information Circular 6190.

Beryllium is a metal resembling aluminum closely in its chemical character. It has a specific gravity of 1.85, is almost as hard as quartz (will scratch glass) and will take a high polish. The use of beryllium as a metal is still more or less in the experimental stage because the cost of extracting the metal from its ores almost makes it prohibitive and the present sources of supply of the ore are limited. Not until such a time when deposits can be found that will assure a definite supply and metallurgical costs are such as to justify its use, will the metal be found in common use.

There are a number of beryllium minerals, but none have been found in commercial quantities, except beryl, which is beryllium-aluminum silicate. The chief use at present for ground beryl is as an addition to porcelain products, where it reduces the coefficient of expansion. Beryllium metal is difficult to separate from aluminum.

Present (Aug. 10, 1944) quotations for beryllium ore are per ton in carload lots, 8 to 12 percent BeO $14.50 per unit, f.o.b. mine.

Beryl occurs in California in the pegmatite dikes of the tourmaline gem district in northern San Diego and northwestern Riverside counties; and an occurrence has recently been noted in western Inyo County, but the quantity is as yet unproved. Thus far there have been no commercial shipments of beryl from California except for gem purposes (the pink and aquamarine varieties).

BISMUTH

Bibliography: State Mineralogist Report XXXV. Bulletins 38, 67, 91. Am. Jour. Sci., 1903, Vol. 16.

During 1942, several hundred pounds of bismuth concentrates were made at a tungsten mine in Fresno County, but no shipments were made during the year.

Several bismuth minerals have been found in California, notably native bismuth and bismite (the ochre) in the tourmaline gem district in San Diego and Riverside counties near Pala. Other occurrences of bismuth minerals, including the sulphide, bismuthinite, have been noted in Inyo, Fresno, Nevada, Tuolumne, San Bernardino, and Mono counties, but only in small quantities. The only commercial production recorded was 20 tons valued at $2,400 in 1904, and credited to Riverside County.

The uses of bismuth are somewhat restricted, being employed principally in the preparation of medicinal salts, and in low melting-point or cliché alloys. These alloys are utilized in automatic fire sprinkler systems, in electric fuses, and in solders.

The present quotation (Aug. 10, 1944) for bismuth is $1.25 per pound, in ton lots for the refined metal.

CADMIUM

Bibliography: U. S. Geol. Surv., Min. Res. of U. S., 1908, 1918.

During 1917 and 1918, cadmium metal was recovered by the electrolytic zinc plant of the Mammoth Copper Company in Shasta County. It was shipped in the form of 'sticks' and amounted to a total of several thousand pounds for the two years, the exact figures being concealed under 'Unapportioned.' That was the first, and thus far the only, commercial production of cadmium recorded from California ore. Cadmium occurs there associated with zinc sulphide, sphalerite. Cadmium also occurs in the Cerro Gordo Mines, Inyo County, associated with smithsonite (zinc carbonate).

Cadmium is produced in the United States in two forms—metallic cadmium and the pigment, cadmium sulphide. The principal use of the metal is in low-melting point, or cliché alloys, and its salts are utilized in the arts, medicine, and in electroplating. The sulphide is employed as a paint pigment, being a strong yellow, which is unaffected by hydrogen sulphide gas from coal smoke. It is also employed in coloring glass and porcelain. Cadmium cliché metal is stated to be superior to the corresponding bismuth alloy, for making stereotype plates. Cadmium is also used in bronze telegraph and telephone wires, and gives some promise of being utilized in electroplating.

The present quotation (Aug. 10, 1944) for cadmium is 90¢ per pound for the metal.

CHROMITE

Bibliography: State Mineralogist Reports IV, XII, XIII, XIV, XV, XVII, XVIII, XXI-XXIX (inc.), XXXI, XXXIV-XXXIX (inc.). Bulletins 38, 76, 91. Preliminary Report 3. U. S. G. S., Bull. 430. Min. & Sci. Press, Vol. 114, p. 552.

During 1943 shipments of chromite or chrome-iron ore in California were made from properties in Butte, Calaveras, Del Norte, El Dorado, Fresno, Glenn, Humboldt, Lake, Mendocino, Nevada, Placer, Plumas, San Benito, San Luis Obispo, Shasta, Sierra, Siskiyou, Sonoma, Tehama, Trinity, and Tuolumne counties. The annual details are concealed under the 'Unapportioned' item as provided for in regulations of the Office of War Information, but will be released at some later date.

Occurrence

Chromite is widely distributed in California, the principal production, thus far, having come from El Dorado, San Luis Obispo, Del Norte, Shasta, Siskiyou, Placer, Fresno, and Tuolumne counties. In 1918 a total of 29 counties contributed to the State's output. There are two main belts in California yielding this mineral, one along the Coast Ranges from San Luis Obispo County to the Oregon line, including the Klamath Mountains at the north end, and the other in the Sierra Nevada from Tulare County to Plumas County. Chromite occurs as lenses in basic igneous rocks such as periodite and pyroxenite, and in serpentines which have been derived by alteration of such basic rocks.

Uses

The major consumption of chromite ore is for use as a refractory lining in smelting furnaces for steel and copper. A smaller portion is used in the preparation of ferrochrome for chrome-steel alloys, and of chromium chemicals, the latest development of which is chrome plating as used in the automobile industry, on ships, and in oil refineries to protect metal surfaces from wear and erosion.

Chromite concentrates from Californian mines at stockpile Metal Reserve Company, Sacramento. *Photo by Walter W. Bradley*

Total Chromite Production of California

Production of chromite in California began, apparently in the period 1869-1873 in Del Norte County, followed by San Luis Obispo in 1874. There was considerable activity in San Luis Obispo from 1880 to 1883, inclusive, and a total of 23,238 long tons (or 26,028 short tons) valued at $329,924 was shipped from that county up to the beginning of 1887. There are records of shipments from Sonoma County (before 1883), Placer County (1883 and 1884), and Calaveras County. Apparently the state's total in the period 1869-1883 was some 45,000 tons.[1] The tabulation herewith shows the output of chromite in California annually, including the earliest figures so far as they are available. The figures from 1887 to date are from the records of the State Mining Bureau:

[1] Day, D. T., Mineral Res. of the U. S. 1882-1884, U. S. G. S., pp. 569, 570, 1885.

Year	Tons	Value	Year	Tons	Value
1869-1883			1912	1,270	11,260
Del Norte County			1913	1,180	12,700
Sonoma County	19,000	$239,400	1914	1,517	9,434
Placer County			1915	3,725	38,044
Calaveras County			1916	48,943	717,244
1874-1887 (San Luis Obispo County)	26,028	329,924	1917	52,379	1,130,298
1887	3,000	40,000	1918	73,955	3,649,497
1888	1,500	20,000	1919	*4,314	97,164
1889	2,000	30,000	1920	1,770	43,031
1890	3,599	53,985	1921	347	6,870
1891	1,372	20,580	1922	379	6,334
1892	1,500	22,500	1923	84	1,658
1893	3,319	49,785	1924	350	6,700
1894	3,680	39,980	1925	191	3,712
1895	1,740	16,795	1926	393	7,063
1896	786	7,775	1927	225	5,063
1897			1928	729	15,179
1898			1929	327	5,025
1899			1930	84	1,905
1900	140	1,400	1931	441	6,737
1901	130	1,950	1932 [a]	1,206	16,587
1902	315	4,725	1933		
1903	150	2,250	1934	294	3,498
1904	123	1,845	1935	488	6,111
1905	40	600	1936	221	3,314
1906	317	2,859	1937	1,918	20,830
1907	302	6,040	1938	982	10,864
1908	350	6,195	1939	3,936	52,673
1909	436	5,309	1940	2,599	32,796
1910	749	9,707	1941	17,307	355,354
1911	935	14,197	1942	[a]	[a]
			1943	[a]	[a]
			Totals	293,067	$7,205,296

* Recalculated to 45% Cr_2O_3 beginning with 1919.
[a] Included under 'Unapportioned.'

COBALT

Bibliography: Report XIV, XXXIII, XXXIV, XXXVII. Bulletins 67, 91. U. S. G. S., Min. Res. of U. S., 1912, 1918. U. S. B. M., I.C. 6331.

Occurrences of some of the cobalt minerals have been noted in several localities in California, but to date no commercial production has resulted. Some of the copper ores of the foothill copper belt in Mariposa and Madera counties have been found to contain cobalt up to 3%.

The nominal quotation for cobalt (August 10, 1944) is around 97 to 99% at $2.11 per pound for the refined metal in small lots.

The most important use of cobalt is in the manufacture of the alloy, stellite, in which it is combined with chromium, for making high-speed lathe tools, and non-tarnishing cutlery and surgeons' appliances. The metal is also used in electroplating, similarly to nickel; and the oxide, carbonate, chloride, sulphate and other salts are used in ceramics for coloring. Some of the organic salts of cobalt (acetate, resinate, oleate) are employed as 'driers' in paint and varnish.

COPPER

Bibliography: State Mineralogist Reports VIII-XXXIX (inc.). Bulletins 23, 50, 91.

The total output of copper in California during 1943 amounted to 17,172,440 pounds recoverable metal, valued at $2,232,417. This was an increase in both amount and value as compared with the 1942 figures

which were 2,138,149 pounds worth $258,716. The average price of copper during 1943 was 13¢ per pound compared with 12.1¢ in 1942; 11.8¢ per pound in 1941; 11.3¢ per pound in 1940; 10.4¢ per pound in 1939; 9.8¢ in 1938; 12.1¢ in 1937; 9.2¢ in 1936; 8.3¢ in 1935; and 8.0¢ in 1934.

Distribution of the 1943 output of copper in California by counties was as follows:

County	Pounds	Value
Amador	624,336	81,164
Butte	127,321	16,552
Calaveras	4,187,236	544,341
El Dorado	20,282	2,637
Inyo	973,870	126,603
Kern	2,726	354
Madera	21,940	2,852
Mono	10,170	1,322
Nevada	4,549	591
Placer	4,088	531
Plumas	13,252	1,723
San Bernardino	85,875	11,164
Shasta	1,380,149	179,419
Siskiyou	9,707,958	1,262,035
Tuolumne	4,933	641
Los Angeles, Mariposa, Orange*	3,755	488
Totals	17,172,440	$2,232,417

* Combined to conceal the output of individual producers in each.

Reclaiming copper mill-tailings at Copperopolis, Calaveras County, by Pacific Mining Company. *Photo by Water W. Bradley*

According to the U. S. Bureau of Mines[1] the smelter production of primary copper from domestic sources during 1943 totaled 1,092,939 short

[1] U. S. Bureau of Mines Mineral Market Report MMS 1200, July 7, 1944.

tons compared with 1,087,991 short tons for 1942 or an increase of approximately one-half percent. The average price of copper during the year as reported to the U. S. Bureau of Mines by selling agents was 11.8¢ per pound f.o.b. refinery but not including bonus payments of the Metal Reserve Company.

Copper Production of California, by Years

Although some mining of copper ores in a small way had been done earlier, shipments in appreciable quantities began in 1861 and continued of importance up to the end of 1867, when a total of 68,631 tons (of 2376 pounds) of high-grade ores, and 847 tons of matte or 'regulus'[2] had been shipped to smelters at New York, Boston, and Swansea, Wales. The most important district at that time was Copperopolis and vicinity in Calaveras County, with some shipments also made from Mariposa, El Dorado, Fresno and San Luis Obispo counties. From 1868 to 1882, the output was insignificant. There are wide discrepancies in the figures recorded for copper production previous to 1882, in which year the data of the U. S. Geological Survey began. The detailed statistics of the California State Mining Bureau began in the year 1894.

Amount and value of copper production in California annually since 1882 is given in the following tabulation:

Copper Production of California, by Years

Year	Pounds	Value	Year	Pounds	Value
1882	826,695	$144,672	1913	34,471,118	$5,343,023
1883	1,600,862	265,743	1914	30,491,535	4,055,375
1884	876,166	120,911	1915	40,968,966	7,169,567
1885	469,028	49,248	1916	55,809,019	13,729,017
1886	430,210	43,021	1917	48,534,611	13,249,948
1887	1,600,000	192,000	1918	47,793,046	11,805,883
1888	1,570,021	235,303	1919	22,162,605	4,122,246
1889	151,505	18,180	1920	12,947,299	2,382,303
1890	23,347	3,502	1921	12,088,053	1,559,358
1891	3,397,405	424,675	1922	22,883,987	3,090,582
1892	2,980,944	342,808	1923	28,346,860	4,166,989
1893	239,682	21,571	1924	52,089,349	6,823,704
1894	738,594	72,486	1925	46,968,499	6,669,527
1895	225,650	21,901	1926	33,521,544	4,693,014
1896	1,922,844	199,599	1927	27,350,316	3,582,888
1897	13,638,626	1,540,666	1928	25,162,304	3,623,360
1898	21,543,229	2,475,168	1929	33,809,258	5,941,799
1899	23,915,486	3,990,534	1930	26,534,752	3,449,522
1900	29,515,512	4,748,242	1931	12,954,842	1,178,890
1901	34,931,788	5,501,782	1932	1,417,536	89,307
1902	27,860,162	3,239,975	1933	992,515	63,521
1903	19,113,861	2,520,997	1934	590,638	47,252
1904	29,974,154	3,969,995	1935	2,031,836	168,645
1905	16,997,489	2,650,605	1936	9,991,799	919,245
1906	28,726,448	5,522,712	1937	10,512,500	1,272,013
1907	32,602,945	6,341,387	1938	1,613,491	158,122
1908	40,868,772	5,350,777	1939	8,390,215	872,582
1909	65,727,736	8,478,142	1940	12,833,363	1,450,170
1910	53,721,032	6,680,641	1941	8,101,449	955,970
1911	36,838,024	4,604,753	1942	2,138,149	258,716
1912	34,169,997	5,638,049	1943	17,172,440	2,232,417
			Totals	1,217,841,108	$190,534,920

[2] Browne, J. Ross, Mineral Resources West of the Rocky Mountains, p. 168, 1867.

GOLD

Bibliography: State Mineralogist Reports I to XXXIX (inc.), (except III and VIII). Bulletins 36, 45, 57, 91, 92, 95, 108. U. S. Geol. Surv., Prof. Paper 73. U. S. Bur. of Mines, Econ. Paper 3 (1929).

Gold was first, and, for many years, the most important single mineral product of California. Although now surpassed for a number of years in annual value by petroleum, and by natural gas from 1923 to 1932, and 1943; and headed the metal list till 1943 when it was passed in value by both quicksilver and tungsten ore. Prior to 1943 California outranked all other gold producing states in the United States for many years.

There was a steady increase in the output of both lode and placer mines in California from 1928 to 1942, but in 1941 the value of placer production continued to increase, although that of lode dropped off 8 percent and in 1942 a sharp decline in the yield of both lode and placer mines, first by the increased difficulty of obtaining supplies and labor and on October 8, 1942, the War Production Board's Order L-208, closing down most of the gold and silver mines in the State. During 1943 there were 139 operating lode mines, and 82 placer properties compared with 434 lode mines and 428 placer mines in 1942, but these did not include snipers, prospectors and various individuals selling gold in small lots to bullion dealers.

The production of gold in California during 1943 totaled 148,328 fine ounces valued at $5,191,480, being a decrease of 699,669 fine ounces from the 1942 yield, which was 847,997 fine ounces worth $29,679,895.

Central Eureka Mine at Sutter Creek, Amador County, on Mother Lode; mill tailings dump in foreground. *Photo by Walter W. Bradley*

Deep or lode mines accounted for 58,903 fine ounces worth $2,061,605 and placers (mainly bucket line, drag-line, and power shovel dredges) produced 89,425 fine ounces worth $3,129,875.

The 1940 output was the largest in value since 1856 and in amount since 1862. The 1939 lode output of gold was undoubtedly the largest in the history of the State, while the yield of 1943 was the smallest in both amount and value since 1848, the year that gold was discovered in California.

As the Division of Mines has never independently gathered the statistics of gold and silver production, these figures, as in former years, are published by cooperation with and through the courtesy of Charles White Merrill of the Division of Mineral Statistics, U. S. Bureau of Mines.

The leading four counties in production were Yuba, Nevada, Sacramento, and Amador counties with Yuba County the only one to exceed the million dollar mark. Nineteen forty-three was the first year since 1880, the year that a segregation of gold by counties was first made, that the value of this metal from Nevada or Amador was less than a million dollars; and that of Sacramento County since 1908. In 1941 there were 15 counties with a gold output worth more than a million dollars and in 1942 eight counties.

The gold from Nevada, Kern, Amador, Mariposa, Sierra, and Tuolumne counties is mainly from the lode or deep mines; while that from Butte, Sacramento, San Joaquin, and Yuba counties is almost entirely from dredges.

Distribution for the 1943 gold output by counties was as follows:

Counties	Mines producing[1]		Totals	
	Lode	Placer	Fine ounces	Value
Amador	6	3	2,606	$91,210
Butte	2	5	15,004	525,140
Calaveras	11	3	2,756	96,460
El Dorado	6	1	144	5,040
Fresno	----------	1	36	1,260
Humboldt	----------	1	199	6,965
Inyo	21	----------	4,375	153,125
Kern	12	6	2,963	103,705
Los Angeles	----------	2	97	3,395
Madera	3	1	10	350
Mariposa	14	2	6,489	227,115
Merced	----------	1	81	2,835
Mono	4	----------	8	280
Nevada	8	3	21,483	751,905
Placer	7	9	1,260	44,100
Plumas	5	2	214	7,490
Sacramento	----------	4	16,156	565,460
San Bernardino	14	2	2,352	82,320
San Joaquin	----------	3	5,070	177,450
Shasta	5	3	2,162	75,670
Sierra	5	6	4,669	163,415
Siskiyou	4	10	3,144	110,040
Stanislaus	----------	3	7,476	261,660
Trinity	1	6	889	31,115
Tuolumne	9	(2)	10,399	363,965
Yuba	----------	5	38,286	1,340,010
Totals	139	82	148,328	5,191,480

[1] Excludes itinerant prospectors, snipers, high-graders, and others who gave no evidence of legal right to property.

[2] Output from property not classed as a "mine."

The following is quoted from the advance statement of gold in 1943 by courtesy of the U. S. Bureau of Mines,* Department of the Interior:

"*Gold.* An uninterrupted rise beginning in 1929 culminated in the production of $50,948,485 in gold in 1940, the largest value since 1856. In 1941, however, a reaction set in which gained headway in 1942. By January 1943 monthly production had sunk to 16,425 ounces, and thereafter it fluctuated between that figure and a low of 8,547 ounces established in February. The year ended with an output of 9,824 ounces in December, second-lowest month of the year. Compared with 1942 the decrease of 699,669 ounces ($24,488,415) recorded in 1943 was greater in both quantity and value than that between any other two years in the State's history, not excluding 1852-53, 1854-55, and 1856-57, when flush placer output was failing; 1883-84, when the Sawyer Decision drastically reduced hydraulicking; and 1917-18, when World War I caused many operations to suspend or curtail output.

"The 25 leading gold-producing mines in California in 1943, listed in the following table, yielded 92 percent of the total gold output of the State; the leading five mines produced 57 percent and the leading 10 mines 73 percent. Many changes have taken place in the list since 1942; only nine of the mines listed in 1942 are on the 1943 list.

Twenty-five Leading Gold-producing Mines in California in 1943, in Order of Output

Rank	Mine	District	County	Rank in 1942	Operator	Source of gold
1	Yuba Unit	Yuba River	Yuba	2	Yuba Consolidated Gold Fields	Dredge
2	Natomas Co.	Folsom	Sacramento	1	Natomas Co.	Dredge
3	Lava Cap	Grass Valley-Nevada City	Nevada	5	Lava Cap Gold Mining Corp.	Gold ore
4	Feather River channel	Oroville	Butte	26	Golden Feather Dredging Co.	Dragline
5	Eagle Shawmut	Mother Lode	Tuolumne	11	Miller & Clemson	Gold ore
6	Empire Star mines	Grass Valley-Nevada City	Nevada	4	Empire Star Mines Co., Ltd., and New Verde Mines Corp.	Gold ore
7	Tuolumne gold dredge	La Grange	Stanislaus	37	Tuolumne Gold Dredging Corp.	Dredge
8	Upper Comanche dredge	Camanche	San Joaquin	59	Gold Hill Dredging Co.	Dredge
9	Original Sixteen to One	Alleghany	Sierra	14	Original Sixteen to One Mine, Inc.	Gold ore
10	Columbia No. 2	Resting Springs	Inyo	42	Shoshone Mines, Inc.	Lead ore
11	Oroville dredge	Oroville	Butte	34	Oroville Gold Dredging Co.	Dredge
12	Placer Properties	Knights Ferry	Stanislaus	15	Placer Properties Co.	Dragline
13	Pine Tree and Josephine	Mother Lode	Mariposa	28	Pacific Mining Co.	Gold ore
14	Dakin (Gray Eagle)	Klamath River	Siskiyou	[1]	Gray Eagle Copper Co.	Copper ore
15	Mount Gaines	Hunter Valley	Mariposa	23	Mount Gaines Mining Co.	Gold ore
16	Plymouth Tailings	Mother Lode	Amador	55	Argonaut Mining Co., Ltd.	Gold ore
17	Bagdad-Chase	Buckeye	San Bernardino	31	Frank Royer	Gold ore
18	Quail Hill	West Belt	Calaveras	[1]	G. Ivan Smith	Zinc ore and zinc-copper ore
19	Kutras tract	Redding	Shasta	65	Columbia Construction Co., Inc.	Nonfloat
20	Cactus Queen	Mojave	Kern	9	Cactus Mines Co.	Gold ore
21	Lower Comanche dredge	Camanche	San Joaquin	38	Gold Hill Dredging Co.	Dredge
22	Tungold	Randsburg	Kern	383	Rand Gold Dredging Associates	Dredge
23	Feliciana	Mother Lode	Mariposa	79	Russell Wilson	Gold ore
24	Relief Hill	North Bloomfield	Nevada	119	Weston Gold, Inc.	Hydraulic
25	Red Hill	Junction City	Trinity	173	Goldfield Consolidated Mines Co.	Hydraulic

[1] Not operated in 1942.

* U. S. Bureau of Mines Mineral Year Book of 1943 (Chapter Reprint) Gold, Silver, Copper, Lead and Zinc in California, pp. 4-7.

Total Gold Production of California

The presence of gold in stream gravels near Los Angeles was known and worked in a small way by the Indians, at least as early as 1841,[1] and possibly 1820.[2] On March 2, 1844, Don Manuel Castanares, deputy for California to the Congress of Mexico, reported [3] to his government that placers near Los Angeles had produced up to December, 1843, a total of 2000 ounces of gold dust, most of which had been sent to the United States Mint at Philadelphia.

As the padres and the rancheros discouraged the quest of gold, this early, small production caused no particular excitement. It was not until James W. Marshall's finding of gold nuggets in the tail-race of Sutter's saw mill on the American River, January 24, 1848, was heralded abroad that the great rush began, and California became a commonwealth of first rank almost over night. There are, however, no authentic data on gold production prior to 1848, other than occasional, scattered references such as above quoted.

The following table was originally compiled by Chas. G. Yale, of the Division of Mineral Resources, U. S. Geological Survey, but for a number of years statistician of the California State Mining Bureau and the U. S. Mint at San Francisco. The authorities chosen for certain periods were: J. D. Whitney, State Geologist of California; John Arthur Phillips, author of "Mining and Metallurgy of Gold and Silver" (1867); U. S. Mining Commissioner R. W. Raymond; U. S. Mining Commissioner J. Ross Browne; Wm. P. Blake, Commissioner from California to the Paris Exposition, where he made a report on "Precious Metals" (1867); John J. Valentine, author for many years of the annual report on precious metals published by Wells, Fargo & Company's Express; and Louis A. Garnett, in the early days manager of the San Francisco refinery, where records of gold receipts and shipments were kept. Mr. Yale obtained other data from the reports of the director of the U. S. Mint and the director of the U. S. Geological Survey. The authorities referred to who were alive at the time of the original compilation of this table in 1894 were all consulted in person or by letter by Mr. Yale with reference to the correctness of their published data, and the final table quoted was then made up.

There was no premium paid on gold during 1932, the price being $20.67 a fine ounce. On August 29, 1933, there was an executive order lifting the embargo on gold ores, concentrates, precipitates, and unretorted amalgam, followed on October 25, 1933, by another order instructing the Reconstruction Finance Corporation to buy newly-mined gold at a price fixed by the U. S. Treasurer which corresponded to the world price, all of which had an effect on the 1933 gold yield. On January 30, 1934, the Gold Reserve Act of 1934 was passed, followed by the President's proclamation of January 31, 1934, which fixed the weight of the gold dollar at 15 5/21 grains, nine-tenths fine. The value of gold thereby became $35 a fine ounce. The average weighted value of gold per fine ounce in 1934 was $34.95.

The figures for 1903-1923 (inclusive) are those prepared by the U. S. Geological Survey; and since by the U. S. Bureau of Mines:

[1] Hittell, T. H., History of California, Vol. II, p. 12, 1885.
[2] Bancroft, H. H., History of California, Vol. II, p. 417, 1886.
[3] Mercantile Trust Review of the Pacific, Vol. XIV, No. 2, p. 43, Feb. 15, 1925.

Total Gold Production of California, 1848 to 1943

Year	Fine ounces	Value	Year	Fine ounces	Value
1848	11,866	$245,301	1897	767,779	$15,871,401
1849	491,072	10,151,360	1898	769,476	15,906,478
1850	1,996,586	41,273,106	1899	741,881	15,336,031
1851	3,673,512	75,938,232	1900	767,390	15,863,355
1852	3,932,631	81,294,700	1901	821,845	16,989,044
1853	3,270,803	67,613,487	1902	818,037	15,910,320
1854	3,358,867	69,433,931	1903	788,544	16,300,653
1855	2,684,106	55,485,395	1904	901,484	18,633,676
1856	2,782,018	57,509,411	1905	914,217	18,898,545
1857	2,110,513	43,628,172	1906	906,182	18,732,452
1858	2,253,846	46,591,140	1907	809,214	16,727,928
1859	2,217,829	45,846,599	1908	907,590	18,761,559
1860	2,133,104	44,095,163	1909	979,007	20,237,870
1861	2,026,187	41,884,995	1910	953,734	19,715,440
1862	1,879,595	38,854,668	1911	954,870	19,738,908
1863	1,136,897	23,501,736	1912	953,640	19,713,478
1864	1,164,455	24,071,423	1913	987,187	20,406,958
1865	867,405	17,930,858	1914	999,113	20,653,496
1866	828,367	17,123,867	1915	1,085,646	22,442,296
1867	883,591	18,265,452	1916	1,035,745	21,410,741
1868	849,265	17,555,867	1917	971,733	20,087,504
1869	881,830	18,229,044	1918	799,588	16,528,953
1870	844,537	17,458,133	1919	807,667	16,695,955
1871	845,493	17,477,885	1920	692,297	14,311,043
1872	748,951	15,482,194	1921	759,721	15,704,822
1873	726,554	15,019,210	1922	709,678	14,670,346
1874	835,186	17,264,836	1923	647,210	13,379,013
1875	816,377	16,876,009	1924	636,140	13,150,175
1876	735,169	15,610,723	1925	632,035	13,065,330
1877	798,249	16,501,268	1926	576,798	11,923,481
1878	911,343	18,839,141	1927	564,586	11,671,018
1879	949,439	19,626,654	1928	521,740	10,785,315
1880	968,986	20,030,761	1929	412,479	8,526,703
1881	929,920	19,223,155	1930	457,200	9,451,162
1882	829,458	17,146,416	1931	523,135	10,814,162
1883	1,176,329	24,316,873	1932	569,167	11,765,726
1884	657,900	13,600,000	1933	[a]613,579	15,683,075
1885	612,478	12,661,044	1934	[b]719,064	25,131,284
1886	711,911	14,716,506	1935	[c]890,430	31,165,050
1887	657,349	13,588,614	1936	1,077,442	37,710,470
1888	616,000	12,750,000	1937	1,174,578	41,110,230
1889	542,425	11,212,913	1938	1,311,129	45,889,515
1890	595,486	12,309,793	1939	1,435,264	50,234,240
1891	615,759	12,728,869	1940	1,455,671	50,948,485
1892	608,166	12,571,900	1941	1,408,793	49,307,755
1893	606,664	12,538,780	1942	847,997	29,679,895
1894	670,636	13,863,282	1943	148,328	5,191,480
1895	741,798	15,334,317			
1896	831,158	17,181,562	Totals	101,263,996	$2,246,287,561

[a] Value calculated at an average weighted price of $25.56 per fine ounce; previously $20.6718.
[b] Value calculated at an average weighted price of $34.95 per fine ounce.
[c] Value $35 per fine ounce, beginning 1935.

IRIDIUM (see under Platinum)

IRON ORE

Bibliography: State Mineralogist Reports II, IV, V, X, XII-XV (inc.), XVII, XVIII, XXI-XXVII (inc.), XXX, XXXI, XXXIII-XXXVI (inc.), XXXIX. Bulletins 38, 67, 91. Am. Inst. Min. Eng., Trans. LIII. Min. & Sci. Press, Vol. 115, pp. 112, 117-122; Vol. 123, pp. 94-96, 113-114.

Iron ore shipments in California during 1943 totaled 907,458 net tons, valued at $2,341,827 f.o.b. mine, and came from four properties in San Bernardino County and one each in Santa Cruz and Shasta counties. This was the largest annual production of iron ore ever reported in this state, being more than the total of all iron ore mined since 1881 to date, and showed a marked increase over the 1942 yield, which was 99,092 net tons, worth $371,562. The ore mined during the year was hematite from

San Bernardino County which went to the new steel plant at Fontana and was also used in the manufacture of high-iron cement; magnetite from Shasta County and magnetite sands from Santa Cruz County, both used as an aggregate in heavy concrete for ballast.

There are considerable deposits of iron ore known in California, notably in Shasta, Madera, Placer, Plumas, Riverside, San Bernardino, and Los Angeles counties, but production has so far been limited for lack of an economic supply of coking coal. Some pig iron was made in the earlier years, utilizing charcoal for fuel, both in blast furnaces and by electrical reduction; also, ferrochrome, ferromanganese, and ferrosilicon have been made in California.

Iron Ore Production in California, by Years

Total iron ore production of California, with annual amounts and values, is as follows:

Year	Tons	Value	Year	Tons	Value
1881*	9,273	$79,452	1920	5,975	$40,889
1882	2,073	17,766	1921	1,970	12,030
1883	11,191	106,540	1922	3,588	18,868
1884	4,352	40,983	1923	3,102	18,665
1885			1924		
1886	3,676	19,250	1925[a]	785	4,710
1887			1926		
1893	250	2,000	1927[a]	5,272	26,000
1894	200	1,500	1928		
1895			1930		
1907	400	400	1931[a]	100	700
1908			1932		
1909	108	174	1934		
1910	579	900	1935[a]	38,339	163,714
1911	558	558	1936	31,084	155,434
1912	2,508	2,508	1937	5,490	29,340
1913	2,343	4,485	1938	27,878	141,406
1914	1,436	5,128	1939	16,990	77,788
1915	724	2,584	1940		
1916	3,000	6,000	1941[a]	54,707	194,362
1917	2,874	11,496	1942	99,092	371,562
1918	3,108	15,947	1943	907,458	2,341,827
1919	2,300	13,796	Totals	1,252,843	$4,028,462

* Productions for the years 1881-1886 (inc.) were reported as "tons of pig iron" (U.S.G.S., Min. Res. 1885), and for the table herewith are calculated to "tons of ore" on the basis of 47.6% Fe as shown by an average of analyses of the ores (State Mineralogist Report IV, p. 242). This early production of pig iron was from the blast furnaces then in operation at Hotaling in Placer County. Charcoal was used in lieu of coke. Though producing a superior grade of metal, they were obliged finally to close down, as they could not compete with the cheaper English and eastern United States iron brought in by sea to San Francisco.

[a] Annual details concealed under 'Unapportioned.'

LEAD

Bibliography: State Mineralogist Reports IV, VIII-XV (inc.), XVII-XXVIII (inc.), XXX, XXXI, XXXIII-XXXVI (inc.), XXXIX.

The output of lead in California during 1943 amounted to a total of 11,811,034 pounds of recoverable metal valued at $885,827, as compared with 10,329,176 pounds worth $692,054 in 1942. The average value of lead in 1943 was 7.5¢ per pound compared with 6.7¢ in 1942; 5.7¢ per pound in 1941; 5.0¢ per pound in 1940; 4.7¢ per pound in 1939; 4.6¢ per pound in 1938; 5.9¢ per pound in 1937; and 4.6¢ per pound in 1936.

Distribution of the 1943 output of lead by counties was as follows:

County	Pounds	Value
Butte	15,156	$1,136
Calaveras	107,655	8,074
Inyo	11,400,763	855,057
Mono	4,034	303
Nevada	18,346	1,378
Orange	2,518	189
Plumas	3,931	295
San Bernardino	239,514	17,963
Shasta	9,523	714
Tulare	5,080	381
Amador, El Dorado, Kern, Mariposa, Placer*	4,514	337
Totals	11,811,034	$885,827

* Combined to conceal the output of individual operators in each.

Lead Production of the United States

According to data issued by the U. S. Bureau of Mines[1] during 1943, the production of primary lead from domestic ores in the United States was 401,071 net tons valued at $51,337,000, being a decrease in amount and value from 1942 when 467,367 tons of lead from domestic ores worth $58,888,000 was produced. During 1943 there were 675,465 short tons of refined lead consumed in the United States, compared with 607,111 tons in 1942.

Lead Production of California, by Years

Statistics on lead production in California were first compiled by this Bureau in 1887. Amount and value of the output, annually, with total figures, to date, are given in the following table:

[1] U. S. Bureau of Mines, Mineral Market Notes 1217, Aug. 1, 1944.

Lead Production of California, by Years

Year	Pounds	Value	Year	Pounds	Value
1877	[a]7,836,000	$391,800	1911	1,403,839	$63,173
1878	8,640,000	328,320	1912	1,370,067	61,653
1879	4,502,000	191,335	1913	3,640,951	160,202
1880	4,200,000	215,460	1914	4,697,400	183,198
1881	6,680,000	325,316	1915	4,796,299	225,426
1882	[b]4,000,000	196,800	1916	12,392,031	855,049
1883	[c]3,400,000	145,520	1917	21,651,352	1,862,016
1884	3,200,000	120,512	1918	13,464,869	956,006
1885	2,000,000	80,900	1919	4,139,562	219,397
1886	2,000,000	93,400	1920	4,903,738	392,300
1887	[d]1,160,000	52,200	1921	1,149,051	51,707
1888	900,000	38,250	1922	6,511,280	358,120
1889	940,000	35,720	1923	9,934,522	695,416
1890	800,000	36,000	1924	4,984,387	398,751
1891	1,140,000	49,020	1925	7,352,422	639,661
1892	1,360,000	54,400	1926	8,067,873	645,429
1893	666,000	24,975	1927	2,748,440	173,151
1894	950,000	28,500	1928	1,882,795	109,102
1895	1,592,400	49,364	1929	1,428,777	90,014
1896	1,293,500	38,805	1930	3,542,796	176,241
1897	596,000	20,264	1931	3,934,240	245,568
1898	655,000	23,907	1932	2,418,626	72,480
1899	721,000	30,642	1933	772,463	28,583
1900	1,040,000	41,600	1934	804,911	29,655
1901	720,500	28,820	1935	1,142,405	45,695
1902	349,440	12,230	1936	1,098,545	50,533
1903	110,000	3,960	1937	2,402,110	141,724
1904	124,000	5,270	1938	1,003,096	46,142
1905	533,680	25,083	1939	1,061,294	49,880
1906	338,718	19,307	1940	3,092,636	154,632
1907	328,681	16,690	1941	6,900,851	393,348
1908	1,124,483	46,663	1942	10,329,176	692,054
1909	2,685,477	144,897	1943	11,811,034	885,827
1910	3,016,902	134,082			
			Totals	236,437,519	$14,002,145

[a] Quantities for 1877-1881 (inc.) from C. E. Siebenthal, Mineral Resources of U. S. 1912, Part I, U. S. Geol. Survey, p. 339; and values for same years from quotations in Eng. & Min. Jour., of New York.
[b] Estimated.
[c] Quantities and values for 1883-1886 (inc.) from Mineral Resources of U. S. Geol. Surv., 1883-1886, respectively.
[d] Data from 1887 to date from reports of California State Mining Bureau.

MANGANESE

Bibliography: State Mineralogist Reports XII-XV (inc), XVIII, XXII-XXVII (inc.), XXIX-XXXI, XXXIII-XXXIX (inc.). Bulletins 38, 67, 76, 91. U. S. G. S. Bull. 427. Eng. & Min. Jour.-Press, Vol. 117, p. 545.

Manganese ore shipped in California during 1943 came from properties in Alameda, Amador, Calaveras, Humboldt, Imperial, Inyo, Lake, Marin, Mariposa, Mendocino, Nevada, Placer, Plumas, Riverside, San Benito, San Bernardino, San Joaquin, San Luis Obispo, Santa Clara, Shasta, Siskiyou, Stanislaus, Trinity, and Tulare counties. The annual details are concealed under 'Unapportioned' item as provided for in regulations of the Office of War Information, but will be revealed at some later date.

Manganese Ore Production in California, by Years

Production of manganese ore in California began at the Ladd Mine, San Joaquin County, in the Telsa District in 1867. When shipments of this ore to England ceased late in 1874, upwards of 5000 tons had been produced by that property. For some years following that, the output was small. The tabulation herewith shows California's output of man-

Staneuch Manganese Mine near San Luis Obispo, San Luis Obispo County.
Photo by Walter W. Bradley

ganese ore, annually, since 1887, when the compilation of such figures was begun by the State Mining Bureau:

Year	Tons	Value	Year	Tons	Value
1887	1,000	$9,000	1914	150	$1,500
1888	1,500	13,500	1915	4,013	49,098
1889	53	901	1916	13,404	274,601
1890	386	3,176	1917	15,515	396,659
1891	705	3,830	1918	26,075	979,235
1892	300	3,000	1919	11,569	451,422
1893	270	4,050	1920	2,892	62,323
1894	523	5,512	1921	1,005	12,210
1895	880	8,200	1922	540	7,650
1896	518	3,415	1923	690	10,620
1897	504	4,080	1924	1,115	25,785
1898	440	2,102	1925	832	19,450
1899	295	3,165	1926	235	4,700
1900	131	1,310	1927		
1901	425	4,405	1928		
1902	870	7,140	1929*	733	8,216
1903	1	25	1930		
1904	60	900	1931*	207	2,576
1905			1932		
1906	1	30	1934		
1907	1	25	1935*	432	4,630
1908	321	5,785	1936		
1909	3	75	1939	6	45
1910	265	4,235	1940	314	3,206
1911	2	40	1941	3,565	75,057
1912	22	400	1942	*	*
1913			1943	*	*
			Totals	92,768	$2,377,338

* Annual details concealed under 'Unapportioned.'

MOLYBDENUM

Bibliography: State Mineralogist Reports XIV, XVII-XXIV (inc.), XXVI-XXVIII (inc.), XXX, XXXIV-XXXVI (inc.). Bulletins 67, 91. U. S. Bur. of Min., Bulletin 111. Proc. Colo. Sci. Soc., Vol. XI.

Molybdenum is used as an alloy constituent in the steel industry, and in certain forms of electrical apparatus. Included in the latter is its successful substitution for platinum and platinum-iridium in electric contact-making and -breaking devices. In alloys it is used similarly to and in conjunction with chromium, cobalt, iron, manganese, nickel, tungsten and vanadium. The oxides and the ammonium salt have important chemical uses.

The two principal molybdenum minerals are: the sulphide, molybdenite, and wulfenite, lead molybdate; the former furnishing practically the entire commercial output. Molybdenite is found in or associated with acidic igneous rocks, such as granite and pegmatite.

Deposits of disseminated molybdenite are known in several localities in California, and in at least two places it occurs in small masses associated with copper sulphides. The first recorded commercial shipments of molybdenum ore in California were during the war, 1916-1918. Some development work has been done on a high-grade deposit at the head of the Kaweah River, Tulare County.

During 1943 there were shipments of molybdenum concentrates in California coming from a tungsten mine in Inyo County. The annual details are concealed under the 'Unapportioned' item so as not to reveal the output of an individual producer. The 1943 output was the largest annual yield.

The growing consumption of molybdenum by alloy-steel makers in the United States has been stimulated by the fact that molybdenum alone of the steel-alloying metals can be produced commercially in the United States to an extent which avoids all necessity for importation. Another fact has been the marked adaptability of molybdenum steels to large-scale production of automobile and other parts.

The present (Sept. 23, 1943) quotations on molybdenum ores are 45¢ per pound of MoS_2 contained, f.o.b. mine, and on ferromolybdenum are 95¢ per pound Mo, 55%-65% Mo f.o.b. shipping point.

Molybdenum Production of California, by Years

California's production of molybdenum ore by years is summarized in the following tabulation:

Year	Pounds of MoS_2	Value
1916	9,280	$9,945
1917	7,290	9,014
1918		
1919	270	300
1933, 1934[a]	1,306	306
1939, 1940[a]	383,233	147,126
1941, 1942, 1943[a]	3,775,566	1,228,203
Totals	4,176,945	$1,294,894

[a] Annual details concealed under 'Unapportioned.'

NICKEL

Bibliography: State Mineralogist Reports XIV, XVII, XXIV, XXV, XXVIII, XXX, XXXIV-XXXVI, (inc.) XXXIX. U. S. G. S., Bulletin 640-D. U. S. Bureau of Standards, Circular 100.

Nickel occurs in the Friday Copper Mine in the Julian District, San Diego County. The ore is a nickel-bearing pyrrhotite, with some associated chalcopyrite. Some ore has been mined in the course of development work but not treated nor disposed of, as they were unable to get any smelter to handle it for them. Nickel ore has also been reported from other localities in California, but not yet confirmed.

Present (June 11, 1942) quotations for nickel are around 35¢ per pound for the refined metal.

OSMIUM (see under Platinum)

PALLADIUM (see under Platinum)

PLATINUM GROUP METALS

Bibliography: State Mineralogist Reports IV, VIII, IX, XII-XXVI (inc.), XXVIII, XXX, XXXI, XXXIV-XXXVII (inc.). Bulletins 38, 45, 67, 85, 91, 92. U. S. Geol. Surv., Bulletins 193, 285. Trans. Am. Inst. Min. Eng., Vol. 47, pp. 217-218.

In California the platinum-group metals are obtained as a by-product from placer operations for gold. The major portion of it comes from the dredges working in Amador, Butte, Merced, Sacramento, Stanislaus, Shasta, Trinity and Yuba counties, with a small amount coming from the hydraulic and surface sluicing mines of Del Norte, Humboldt, Siskiyou and Trinity counties.

The platinum group metals shipped in 1943 in California came from properties in Butte, Merced, Sacramento, San Joaquin, Siskiyou, Stanislaus, Trinity, and Yuba counties. Practically all of this metal was mined prior to 1943 and not sold till them. Annual details are concealed under the 'Unapportioned' item as provided for in regulations of the Office of War Information, but will be released at some later date.

Present quotations[1] (August 10, 1944) are, platinum $35 a fine ounce; iridium $120 per fine ounce; osmium per fine ounce, $50; palladium per fine ounce, $24; ruthenium per fine ounce $35; rhodium per fine ounce, $125.

[1] E. & M. J., Metal and Mineral Markets, Aug. 10, 1944.

Platinum Production of California, by Years

The annual production and values since 1887 have been as follows:

Year	Ounces	Value	Year	Ounces	Value
1887	416	$10,400	1916	886	$42,642
1888	100	400	1917	610	43,719
1889	500	2,000	1918	571	42,788
1890	500	2,000	1919	*418	60,611
1891	600	2,500	1920	477	68,977
1892	100	500	1921	613	58,754
1893	80	440	1922	795	90,288
1894	75	517	1923	602	78,546
1895	100	600	1924	273	36,452
1896	150	900	1925	292	39,937
1897	162	944	1926	322	32,005
1898	150	900	1927	139	10,749
1899	300	1,800	1928	312	27,902
1900	300	1,800	1929	212	14,416
1901	400	2,500	1930	217	11,700
1902	250	3,200	1931	305	11,979
1903	39	468	1932	278	8,142
1904	70	1,052	1933	236	7,255
1905	123	1,849	1934	424	14,884
1906	200	3,320	1935	121	4,153
1907	91	1,647	1936	1,000	40,669
1908	300	6,255	1937	530	23,704
1909	706	13,414	1938	1,069	35,150
1910	337	8,386	1939	896	32,135
1911	511	14,873	1940	1,358	62,419
1912	603	19,731	1941	909	40,590
1913	368	17,738	1942	*	*
1914	463	14,816	1943	*	*
1915	667	21,149			
			Totals	22,520	$1,096,665

* Fine ounces, beginning with 1919.

QUICKSILVER

Bibliography: State Mineralogist Reports IV, V, XII-XV, XVII-XXIX (inc.), XXXI, XXXIII-XXXVII (inc.). Bulletins 27, 78, 91. U. S. Geol. Surv., Monograph XIII. U. S. Bur. of Mines, Tech. Papers 96, 227; Bulletin 222, 335.

The production of quicksilver in California during 1943 totaled 33,948 flasks, valued at $6,177,159 f.o.b. mine, coming from 86 mines in 17 counties as compared with 30,087 flasks, worth $5,553,357 in 1942, which came from 101 properties in 18 counties. The 1942 and 1943 output was distributed as follows; by counties:

County	1942		1943	
	Flasks 76 lbs.	Value	Flasks 76 lbs.	Value
Fresno	*	*	32	$5,930
Lake	4,216	$792,438	4,206	774,813
Napa	1,905	356,532	2,023	363,017
San Benito	8,873	1,583,182	*	*
San Luis Obispo	2,782	518,657	2,625	478,442
Santa Clara	2,333	436,384	1,736	322,871
Sonoma	4,115	779,930	4,121	761,654
Colusa, Contra Costa, Fresno, Inyo, Kings, Mendocino, Monterey, Santa Barbara, Siskiyou, Stanislaus, Trinity, Yolo*	5,863	1,086,234		
Colusa, Contra Costa, Del Norte, Inyo, Kings, Monterey, San Benito, Santa Barbara, Siskiyou, Trinity, Yolo*			19,205	3,470,432
Totals	30,087	$5,553,357	33,948	$6,177,159

* Combined to conceal production of individual operators in each.

The 1943 output of quicksilver had the highest annual value ever recorded in the past 93 years in which a record had been kept of its production in California, and was the largest in amount since 1895. The California production was the largest of any State in the United States and was approximately 63 per cent of the national yield.

During 1943 the average New York quotation of quicksilver was $195.21 per 76-pound flask, while the average price received by the California miner was $181.96 per 76-pound flask; as compared with the 1942 New York average quotation of $196.35 per 76-pound flask, and the average price received by California miners of $184.58 per 76-pound flask.

Clean-up of quicksilver from condensers at New Almaden Mine, Santa Clara County. *Photo by C. N. Schuette*

Total Quicksilver Production of California

Total amount and value of the quicksilver production of California, as given in available records, are shown in the following tabulation. Though the New Almaden Mine in Santa Clara County was first worked in 1824, and was in practically continuous operation from 1846 to 1921 (the yield being small the first two years), there are no available data on the output earlier than 1850. Previous to June, 1904, a 'flask' of quicksilver contained 76½ pounds; then 75 pounds up to and including 1927; beginning with 1928, 76 pounds. In compiling this table the following sources of information were used: for 1850-1883, table by J. B. Randol, in Report of State Mineralogist IV, p. 336; 1883-1893, U. S. Geological Survey reports; 1894 to date, statistical bulletins of the State Mining Bureau; also State Mining Bureau, Bulletin 27, "Quicksilver Resources of California," 1908, p. 10.

Quicksilver Production of California, by Years

Year	Flasks	Value	Average price per flask	Year	Flasks	Value	Average price per flask
1850	7,723	$768,052	$99 45	1898	31,092	$1,188,626	$38 23
1851	27,779	1,859,248	66 93	1899	29,454	1,405,045	47 70
1852	20,000	1,166,600	58 33	1900	26,317	1,182,786	44 94
1853	22,284	1,235,648	55 45	1901	26,720	1,285,014	48 46
1854	30,004	1,663,722	55 45	1902	29,552	1,276,524	43 20
1855	33,000	1,767,150	53 55	1903	32,094	1,335,954	42 25
1856	30,000	1,549,500	51 65	1804	[a]28,876	1,086,323	37 62
1857	28,204	1,374,381	48 73	1905	24,655	886,081	35 94
1858	31,000	1,482,730	47 83	1906	19,516	712,334	36 50
1859	13,000	820,690	63 13	1907	17,379	663,178	38 16
1860	10,000	535,500	53 55	1908	18,039	763,520	42 33
1861	35,000	1,471,750	42 05	1909	16,217	773,788	47 71
1862	42,000	1,526,700	36 35	1910	17,665	799,002	45 23
1863	40,531	1,705,544	42 08	1911	19,109	879,205	46 01
1864	47,489	2,179,745	45 90	1912	20,600	866,024	42 04
1865	53,000	2,432,700	45 90	1913	15,661	630,042	40 23
1866	46,550	2,473,202	53 13	1914	11,373	557,846	49 05
1867	47,000	2,157,300	45 90	1915	14,199	1,157,449	81 52
1868	47,728	2,190,715	45 90	1916	21,427	2,003,425	93 50
1869	33,811	1,551,925	45 90	1917	24,382	2,396,466	98 29
1870	30,077	1,725,818	57 38	1918	22,621	2,579,472	114 03
1871	31,686	1,999,387	63 10	1919	15,200	1,353,381	89 04
1872	31,621	2,084,773	65 93	1920	10,278	775,527	75 45
1873	27,642	2,220,482	80 33	1921	3,157	140,666	44 56
1874	27,756	2,919,376	105 18	1922	3,466	191,851	55 35
1875	50,250	4,228,538	84 15	1923	5,458	332,851	60 98
1876	75,074	3,303,256	44 00	1924	7,948	543,080	68 33
1877	79,396	2,961,471	37 30	1925	7,683	621,831	80 81
1878	63,880	2,101,652	32 90	1926	5,892	516,382	87 64
1879	73,684	2,194,674	29 85	1927	6,488	714,418	111 67
1880	59,926	1,857,706	31 00	1928	[b]7,107	844,649	118 84
1881	60,851	1,815,185	29 83	1929	10,152	1,195,705	117 78
1882	52,732	1,488,624	28 23	1930	11,374	1,255,257	110 36
1883	46,725	1,343,344	28 75	1931	13,478	1,121,624	83 22
1884	31,913	973,347	30 50	1932	5,349	279,780	52 30
1885	32,073	986,245	30 75	1933	4,102	229,472	55 94
1886	29,981	1,064,326	35 50	1934	7,946	534,135	67 22
1887	33,760	1,430,749	42 38	1935	9,353	628,590	67 23
1888	33,250	1,413,125	42 50	1936	8,758	671,055	76 62
1889	26,464	1,190,880	45 00	1937	9,995	837,789	83 82
1890	22,926	1,203,615	52 50	1938	12,171	846,497	69 55
1891	22,904	1,036,406	45 25	1939	11,201	1,105,563	98 43
1892	27,993	1,139,595	40 71	1940	18,907	3,209,754	169 77
1893	30,164	1,108,527	36 75	1941	25,612	4,509,041	176 03
1894	30,416	934,000	30 70	1942	30,087	5,553,357	184 58
1895	36,104	1,337,131	37 04	1943	33,948	6,177,159	181 96
1896	30,765	1,075,449	34 96				
1897	26,691	993,445	37 28	Totals	2,524,865	$138,661,446	

[a] Flasks of 75 lbs. from June, 1904; of 76½ lbs. previously.
[b] Flasks of 76 lbs. from January, 1928.

SILVER

Bibliography: State Mineralogist Reports IV, VIII, XII-XXXIX (inc.). Bulletins 67, 91, 108. Min. & Sci. Press, March 1, 1919.

The 1943 output of silver totaled 609,075 fine ounces valued at $433,120, being a marked decrease in both amount and value as compared with the 1942 production of 1,450,440 fine ounces worth $1,031,424. Of the 1943 yield 5,920 fine ounces worth $4,261 came from the placers. The average price paid for new mined domestic silver in 1943 was 71.11¢ per fine ounce compared with 71.11¢ in 1942; 71.11¢ in 1941; 71.11¢ in 1940; 67.80¢ in 1939; 64.60¢ in 1938; 77.35¢ in 1937; 77.45¢ in 1936; and 71.875¢ in 1935.

Silver production by counties for 1943 was as follows:

County	*Fine ounces*	*Value*
Amador	2,260	$1,607
Butte	7,176	5,103
Calaveras	37,703	26,811
El Dorado	426	303
Fresno	4	3
Humboldt	28	20
Inyo	384,899	273,706
Kern	10,239	7,281
Los Angeles	17	12
Madera	128	91
Mariposa	1,731	1,231
Merced	28	20
Mono	599	426
Nevada	103,451	73,565
Orange	415	295
Placer	512	364
Plumas	602	428
Sacramento	810	576
San Bernardino	8,910	6,336
San Joaquin	512	364
Shasta	31,957	22,725
Sierra	820	583
Siskiyou	9,439	6,712
Stanislaus	516	367
Trinity	90	64
Tulare	486	346
Tuolumne	3,600	2,560
Yuba	1,717	1,221
Totals	609,075	$433,120

The following paragraph is quoted from the U. S. Bureau of Mines,[a] chapter on Gold and Silver from Mineral Year Book 1943, by courtesy of Charles White Merrill:

"*Silver.* Most of the silver output in California in 1943 was more localized than that of the gold; the 10 leading silver-producing mines listed in the following table yielded 89 percent of the State total recoverable silver in that year, and the 4 leading mines yielded 70 percent. All 10 leading mines derived their silver from ore other than straight silver, and most of them depended on argentiferous base-metal ores.

[a] U. S. Bureau of Mines, Mineral Year Book, 1943. (Chapter reprint), Gold, Silver, Copper, Lead, and Zinc in California, pp. 6-7.

Ten Leading Silver-producing Mines in California, in 1943, in Order of Output

Rank	Mine	District	County	Rank in 1942	Operator	Source of silver
1	Columbia No. 2	Resting Springs	Inyo	3	Shoshone Mines, Inc.	Lead ore
2	Darwin group	Coso	Inyo	6	Darwin Mines (Arthur J. Theis, trustee)	Lead ore
3	Lava Cap	Grass Valley-Nevada City	Nevada	2	Lava Cap Gold Mining Corp.	Gold ore
4	Pine Creek	Bishop Creek	Inyo	5	United States Vanadium Corp.	Tungsten-molybdenum ore
5	Hornet	Flat Creek	Shasta	118	The Mountain Copper Co., Ltd.	Copper ore
6	Last Chance	Coso	Inyo	[1]	L. D. Foreman	Lead ore
7	Quail Hill	West Belt	Calaveras	[1]	G. Ivan Smith	Zinc ore and zinc-copper ore
8	Gold Bottom	Slate Range	Inyo	[1]	Damon & Damon	Gold-Silver ore and zinc ore
9	Dakin (Gray Eagle)	Klamath River	Siskiyou	[1]	Gray Eagle Copper Co.	Copper ore
10	Cactus Queen	Mojave	Kern	1	Cactus Mines Co.	Gold ore

[1] Not operated in 1942.

Silver Production of California, by Years

The amount and value of the silver production of California, and the average price, annually, since 1880 are given in the table following. In the table shown in the statistical bulletins previously to Bulletin 97 (for 1925), the values shown for 1880-1904 (inc.) were taken from the reports of the Director of the Mint, of which the figures for 1880-1896 (inc.) were based on 'coinage value' ($1.2929 per fine ounce). We have recalculated these to commercial value, using the price table of the U. S. Geological Survey (McCaskey, H. D.), Gold and Silver, 1913: Mineral Resources of the U. S., Part I, p. 847. From 1905 to date, the figures are those of the U. S. Geological Survey and its successor, the U. S. Bureau of Mines. Figures for the years prior to 1880 are not available, as there were no reliable records compiled.

Silver Production of California, by Years, Since 1880

Year	Fine oz.	Value	Average price per oz.	Year	Fine oz.	Value	Average price per oz.
1880	882,169	$1,014,494	$1 15	1912	1,300,136	$799,584	$0 615
1881	580,091	655,503	1 13	1913	1,378,399	832,553	604
1882	653,569	745,069	1 14	1914	1,471,859	813,938	553
1883	1,129,244	1,253,461	1 11	1915	1,678,756	851,129	507
1884	3,236,987	3,593,056	1 11	1916	2,564,354	1,687,345	658
1885	1,968,260	2,125,298	1 07	1917	1,775,431	1,462,955	824
1886	1,245,747	1,233,290	99	1918	1,427,711	1,427,711	1 00
1887	1,262,282	1,237,036	98	1919	1,107,189	1,240,051	1 12
1888	1,314,874	1,235,982	94	1920	1,706,327	1,859,896	1 09
1889	823,947	774,510	94	1921	3,629,223	3,629,223	1 00
1890	820,336	861,353	105	1922	3,100,065	3,109,065	1 00
1891	737,224	729,852	99	1923	3,559,443	2,918,743	82
1892	358,575	311,960	87	1924	3,555,133	2,381,952	67
1893	415,468	324,065	78	1925	3,054,416	2,119,765	694
1894	229,896	144,834	63	1926	2,022,460	1,262,015	624
1895	463,911	301,542	65	1927	1,620,242	918,677	567
1896	326,757	222,195	68	1928	1,478,711	865,081	585
1897	754,648	452,789	60	1929	1,176,895	627,285	533
1898	701,788	414,055	59	1930	1,622,803	624,779	385
1899	855,869	513,521	60	1931	867,818	251,667	290
1900	1,168,157	724,257	62	1932	493,533	139,176	282
1901	950,831	570,499	60	1933	402,591	140,907	350
1902	1,163,041	616,412	53	1934	844,413	545,883	[a]644
1903	958,230	517,444	54	1935	1,191,112	856,112	[a]719
1904	1,441,259	835,929	58	1936	2,103,799	1,629,392	[a]775
1905	1,076,174	650,009	61	1937	2,888,265	2,234,073	[a]774
1906	1,220,641	817,830	68	1938	2,590,804	1,674,863	[a]646
1907	1,138,856	751,646	66	1939	2,599,139	1,764,264	[a]678
1908	1,647,278	873,057	53	1940	2,359,776	1,678,063	[a]711
1909	2,098,253	1,091,092	52	1941	2,154,188	1,531,867	[a]711
1910	1,840,085	993,646	54	1942	1,450,440	1,031,424	[a]711
1911	1,270,445	673,336	53	1943	609,075	433,120	[a]711
				Totals	95,527,278	$70,592,590	

[a] Average price applied to newly mined within the United States.

TIN

Bibliography: Reports XV, XVII, XVIII, XXV, XXXI, XXXIV, XXXV-XXXVII. Bulletins 67, 91.

During 1940 there was some development at the Apex Mine nine miles north of Cima, San Bernardino County, but no shipments reported in 1941 to 1943. Here the tin ore occurs in small kidneys along the talcose slip in dolmitic limestone.

In 1928 and 1929 there was a small amount of tin produced from California ore as well as considerable development work which was done at the Temescal mine in Riverside County near Corona. There was an output from the district during 1891-1892 as tabulated below. Small quantities of stream tin have been found in some of the placer workings in northern California, but never in paying amounts.

Two occurrences have also been noted, in northern San Diego County. Crystals of cassiterite were found there, associated with blue tourmaline crystals, amblygonite and beryl. No commercial quantity has been developed, only small pockets having been taken out.

Total Output of Tin in California

Year	Pounds	Value
1891	125,289	$27,564
1892	126,000	32,400
1928 } 1929 [a]	1,200	580
Totals	252,489	$60,544

[a] Annual details concealed under 'Unapportioned.'

TITANIUM

Bibliography: State Mineralogist's Reports XXIII, XXXIV.

During 1943 there were small shipments of titanium ore (ilmenite) made from material recovered from beach sand at Hermosa Beach, Los Angeles County. The annual details are concealed under the 'Unapportioned' item to conceal the output of an individual producer.

All titanium ore mined in this State came from Los Angeles County and was produced from either the beach black sands which contained approximately 20% titaniferous iron and magnetite, the gangue being silica and several silicates, or from a lode deposit in the San Gabriel Mountains (Aug. 10, 1943).

The market price of titanium minerals varies as to the titanium oxide it contains. Present (Sept. 23, 1943) quotations are: Rutile 94% TiO_2 at 8¢ to 10¢ a pound, ilmenite 60% TiO_2 at $28 to $30 a gross ton, all prices Atlantic seaboard.

The metal is used in several different alloys with iron, copper and aluminum and for green and white paint pigments, the only colors of titanium pigments now in common use. It is also used in dyes, rubber, as a porcelain glaze, in glass, and cement made from high-titanium iron slags. This cement is resistant to the action of acids.

Total Output of Titanium in California by Years

Year	Tons	Value
1927 } 1928 } *	10,013	$150,195
1929		
1939 } 1940 } *	160	1,800
1941 } 1942 } *	295	3,685
1943	*	*
Totals	10,468	$155,680

* Annual details concealed under 'Unapportioned.'

TUNGSTEN

Bibliography: Reports XV, XVII, XVIII, XXII, XXIV, XXVIII (inc.), XXX, XXXIV-XXXVII (inc.). Bulletins 38, 67, 91, 95, U.S.G.S., Bull. 652. Proc. Colo. Sci. Soc., Vol. XI. South Dakota School of Mines, Bulletin No. 12. Eng. and Min. Jour.-Press, Vol. 113, pp. 666-669, Apr. 22, 1922.

The commercial production of tungsten ores and concentrates in California began in 1905; and has been continuous since, with the exception of 1920-1922, inclusive.

During 1943 shipments were made in California of high-grade sorted tungsten ore and concentrates of a total of 254,118 units of WO_3 or an equivalent of 4,235 tons of 60% concentrates valued at $5,910,745 and coming from properties in Alpine, Fresno, Inyo, Kern, Mariposa, Madera, Mono, Nevada, Riverside, San Bernardino, and Tulare counties. The 1943 output was the largest annual yield ever reported in this State and exceeded that of 1942, which was 231,201 units of WO_3 or an equivalent of 3,853 tons of 60% concentrates worth $5,586,770. The 1942 production came from properties in Fresno, Inyo, Mono, Riverside, San Bernardino, Tulare, and Tuolumne counties. The average amount received by California miners in 1943 was $23.26 per unit WO_3, compared with $24.16 per unit WO_3 in 1942; $23.77 per unit WO_3 in 1941; $21.15 per unit WO_3 in 1940; and $15.47 per unit WO_3 in 1939.

Distribution by counties of the 1942 and 1943 production in California is as follows:

County	1942		1943	
	Units	Value	Units	Value
Fresno	2,236	$50,260	2,888	$79,105
Inyo	193,723	4,705,615	213,700	4,841,322
Kern	2,591	61,682	2,112	57,697
San Bernardino	30,769	723,613	28,172	772,226
Tulare	1,021	26,996	5,320	108,192
Mono, Riverside, Tuolumne*	861	16,604		
Alpine, Mariposa, Madera, Mono, Nevada*			1,926	52,203
Totals	231,201	$5,586,770	254,118	$5,910,745

* Combined to conceal the output of individuals in each.

Tungsten ores have been produced in California principally in the Atolia-Randsburg district in San Bernardino and Kern counties, and the Bishop district in Inyo County; with smaller amounts having come from near Posey (Jack Ranch), Tulare County; Benton, Mono County; the Kings River district in Fresno County; in eastern San Bernardino County near Goffs and Ivanpah; the Grass Valley district in Nevada County; and recently added to the above is the Darwin district in Inyo County; the Kernville and Weldon districts in Kern County; Topaz Lake district in Mono County; and near Warm Springs, San Diego County. Also there are known occurrences of tungsten ores in Alpine, Calaveras, El Dorado, Mariposa, Madera, Plumas, Riverside, Shasta, and Tuolumne counties, of which several are now in production. It

also should be considered that in the last ten years there have been more new tungsten deposits discovered than any other type of mineral deposit in this State. Nearly all the ore mined in California has been scheelite (calcium tungstate), although wolframite (iron-manganese tungstate), hübnerite (manganese tungstate), and other tungsten minerals are found in small amounts, in part associated with the scheelite.

Total Tungsten Ore Production of California

The annual amount and value of tungsten ores and concentrates produced in California since the inception of the industry is given herewith, with tonnages recalculated to 60% WO_3:

Tungsten Production of California by Years

Year	Tons at 60% WO_3	Value	Average unit WO_3 value	Year	Tons at 60% WO_3	Value	Average unit WO_3 value
1905	57	$18,800	$5 50	1926	441	$316,560	$11 96
1906	485	189,100	6 50	1927			
1907	287	120,587	7 00	1928 [a]	649	429,237	11 03
1908	105	37,750	5 99	1929	150	106,280	11 81
1909	577	190,500	6 50	1930			
1910	457	208,245	7 60	1931 [a]	120	82,582	11 47
1911	387	127,706	5 50	1932	26	9,509	6 10
1912	572	206,000	6 00	1933	148	76,605	8 63
1913	559	234,673	7 00	1934	261	224,417	14 33
1914	420	180,575	7 17	1935	218	194,542	14 87
1915	962	1,005,467	17 42	1936	236	210,819	14 89
1916	2,270	4,571,521	33 57	1937	611	782,187	21 34
1917	2,466	3,079,013	20 81	1938	732	786,860	17 92
1918	1,982	2,832,222	24 82	1939	1,235	1,153,735	15 47
1919	214	219,316	17 08	1940	1,784	2,267,135	21 15
1920				1941	2,860	4,080,628	23 77
1923	34	19,126	8 17	1942	3,853	5,586,770	24 16
1924	781	446,009	9 52	1943	4,235	5,910,745	23 26
1925	573	348,475	10 14	Totals	30,747	$36,253,592	

[a] Annual details concealed under 'Unapportioned.'

VANADIUM

Bibliography: Reports XV, XXVI. Bulletins 67, 91. Proc. Colo. Sci. Soc., Vol. XI, XXXVI. U. S. Bur. of Mines, Bulletin 104.

No commercial production of vanadium has yet been made in California. Occurrences of this metal have been found at Camp Signal, near Goffs, in San Bernardino County, and two companies at one time did considerable development work in the endeavor to open up paying quantities. Some ore carrying lead vanadate has been developed in the 29 Palms, or Washington district, on the line between Riverside and San Bernardino counties, but no shipments reported.

The principal use of vanadium is as an alloy in steels, especially in tool steel, and in those varieties where resistance to repeated strains is required. Present (Aug. 10, 1944) New York quotations for ferro-vanadium are $2.70-$2.90 per pound of vanadium f.o.b. works, and vanadium ore 27½¢ per pound V_2O_5 contained.

ZINC

Bibliography: State Mineralogist Reports XIV, XV, XVII, XVIII, XX-XXIV, XXVI, XXVII, XXX, XXXIII-XXXV (inc.). Bulletins 38, 67, 91.

The recoverable zinc metal mined in California during 1943 amounted to a total of 5,170,627 pounds valued at $558,427 and came from properties in Butte, Calaveras, Inyo, Kern, San Bernardino, and Shasta counties. The 1943 output was an increase in both amount and value as compared with that of 1942 which was 1,275,906 pounds worth $118,659 and came from properties in Calaveras, Inyo, Orange, and San Bernardino counties.

Primary zinc produced in the United States[1] during 1943 amounted to 942,309 short tons valued at $170,284,000, compared with 891,872 short tons worth $164,442,000 in 1942. The consumption of slab zinc in the United States in all industries during 1943 was 816,777 short tons, compared with 728,169 short tons in 1932.

The zinc ores in Shasta and Calaveras counties are associated with those of copper, while those of Inyo, Los Angeles, Orange, San Bernardino, and Tulare were associated principally with lead-silver and zinc-silver ores.

Total Zinc Production of California

Total figures for zinc output of the State are as follows, commercial production dating back only to 1906:

Year	Pounds	Value	Year	Pounds	Value
1906	206,000	$12,566	1925	11,546,602	$877,542
1907	177,759	10,598	1926	20,447,559	1,533,568
1908	54,000	3,544	1927	8,625,004	552,000
1909			1928		
1910			1929		
1911	2,679,842	152,751	1931	149,865	5,314
1912	4,331,391	298,866	1932		
1913	1,157,947	64,845	1933	290,222	12,189
1914	399,641	20,381	1934	721,719	31,034
1915	13,043,411	1,617,383	1935	328,013	14,432
1916	15,950,565	2,137,375	1936	29,740	1,487
1917	11,854,804	1,209,190	1937	39,643	2,577
1918	5,565,516	506,466	1938	17,554	843
1919	1,384,192	101,046	1939	16,390	852
1920	1,188,009	96,229	1940	182,088	11,472
1921	846,184	42,309	1941	880,612	66,046
1922	3,034,430	172,963	1942	1,275,906	118,659
1923			1943	5,170,627	558,427
1924	3,060,000	198,900			
			Totals	114,655,283	$10,431,854

[1] U. S. Bureau of Mines, Mineral Market Report 1216, Aug. 1, 1944.

CHAPTER FOUR

STRUCTURAL MATERIALS

Bibliography: State Mineralogist Reports XII-XXXVIII (inc.). Bulletin 38. Spurr and Wormser, "Marketing of Metals and Minerals." "Non-Metallic Minerals," by R. B. Ladoo. "Industrial Minerals and Rocks," A. I. M. E., 1937. See also under each substance.

As indicated by this subdivision heading, the mineral substances herein considered are those more or less directly used in building and structural work. California is independent, so far as these are concerned, and almost any reasonable construction can be made with materials produced in the State. Chromite, which previous to 1933 was listed under structural materials in the statistical reports of the State Division of Mines, has been transferred to the metals group, thus coinciding with the practice of the United States Bureau of Mines.

Lime, previous to 1942, which was carried under this group, is now combined with limestone in the industrial group, so as to avoid possible duplication and because most of the lime is used in industry and not in construction. This "structural" branch of the mineral industry for 1943 had a total value of $55,055,016, compared with $70,121,466 in 1942. All materials grouped in this classification during 1943 showed a decrease in amount and value, with the exception of slate, in comparison with 1942.

In 1943 all counties but one, namely Sutter, contributed to the structural materials total. There is not a county in the fifty-eight counties of the State which is not capable of producing at least one of the materials under the classification.

The following summary shows the value of the structural materials produced in California during the years 1942-1943, with increases or decreases in each instance:

Substance	1942		1943		Increase + Decrease— Value
	Amount	Value	Amount	Value	
Brick and hollow building tile		$5,708,967		$4,368,675	$1,340,292—
Cement	23,306,578 bbls.	35,808,841	18,515,085 bbls.	27,865,466	7,943,375—
Granite		186,871		148,160	38,711—
Sandstone		8,587		*	*
Stone, miscellaneous	45,455,085 tons	27,281,342	32,599,456 tons	21,716,223	5,565,119—
Unapportioned		[a]1,126,857		[b]956,492	170,365—
Total value		$70,121,466		$55,055,016	
Net decrease					$15,066,450

* Included under 'Unapportioned.'
[a] Includes bituminous rock, magnesite, marble, slate, paving blocks, and tube-mill pebbles.
[b] Includes bituminous rock, magnesite, sandstone, slate, paving blocks, tube-mill pebbles.

ASPHALT

Bibliography: State Mineralogist Reports VII, X, XII-XV (inc.), XVII, XVIII. Bulletins 16, 32, 63, 67, 69, 91, 118.

Asphalt was for a number of years accounted for in the statistical reports by the State Mining Bureau, because in the early days of the oil industry, considerable asphalt was produced from outcroppings of

oil sand, and was a separate industry from the production of oil itself. However, at the present time most of the asphalt comes from the oil refineries, which produce a better and more uniform grade; hence, its value is not now included in the mineral total, as to do so would be in part a duplication of the crude petroleum figures. Such natural asphalt as is at present mined is in the form of bituminous sandstones, and is recorded under that designation.

BITUMINOUS ROCK

Bibliography: State Mineralogist Reports XII, XIII, XV, XVII, XVIII, XXI, XXII, XXV, XXVI, XXXI.

This material is essentially an uncemented sandstone which is saturated with and held together by a natural asphaltic constituent, probably the residue from the evaporation of a crude petroleum deposit. Bituminous rock is still used to a limited extent for road dressing in those districts adjacent to available deposits, though the manufacture of asphalt at the oil refineries has almost entirely superseded the direct use of the native material. Some of the Santa Cruz County production is put on the market as a material which can be laid cold. This material is especially applicable and valuable for patch jobs.

During 1943 the output of bituminous rock in California came from a single property each in Santa Barbara and Santa Cruz counties; the annual details are concealed under the 'Unapportioned' item so as not to reveal the output of either operator. The 1943 production showed a decrease in amount and value as compared with that of 1942.

Bituminous Rock Production of California, by Years

The following tabulation shows the total amount and value of bituminous rock quarried and sold in California, from the records compiled by the State Mining Bureau, annually since 1887:

Year	Tons	Value	Year	Tons	Value
1887	36,000	$160,000	1916	19,449	$ 66,561
1888	50,000	257,000	1917	5,590	18,580
1889	40,000	170,000	1918	2,561	9,067
1890	40,000	170,000	1919	4,614	18,537
1891	39,962	154,164	1920	5,450	27,825
1892	24,000	72,000	1921	8,298	43,192
1893	32,000	192,036	1922	4,624	13,570
1894	31,214	115,193	1923	2,945	11,780
1895	38,921	121,586	1924	6,040	14,922
1896	49,456	122,500	1925	2,681	10,724
1897	45,470	128,173	1926	3,863	21,577
1898	46,836	137,575	1927	3,515	17,704
1899	40,321	116,097	1928	4,966	38,832
1900	25,306	71,495	1929	3,320	14,360
1901	24,052	66,354	1930	8,525	36,075
1902	33,490	43,411	1931		
1903	21,944	53,106	1932	23,653	109,140
1904	45,280	175,680	1933		
1905	24,753	60,436	1934	36,793	130,301
1906	16,077	45,204	1935		
1907	24,122	72,835	1936	41,681	133,344
1908	30,718	109,818	1937		
1909	34,123	116,436	1938	36,128	139,242
1910	87,547	165,711	1939	16,546	63,612
1911	75,125	117,279	1940		
1912	44,073	87,467	1941	29,709	86,903
1913	37,541	78,479	1942		
1914	66,119	166,618	1943	39,798	156,193
1915	17,789	61,468	Totals	1,432,988	$4,585,162

* Annual details concealed under 'Unapportioned.'

BRICK AND HOLLOW TILE

Bibliography: State Mineralogist Reports VIII, X, XII--XV (inc.), XVII-XXVIII (inc.), XXXII, XXXVII. Bulletins 38, 39. Preliminary Report No. 7. Cal. Jour. of Development, June, 1925, pp. 5-6.

Bricks of many varieties and in important quantities are annually produced in California, as might be expected in a State with such diversified and widespread mineral resources. The varieties include common, fire, pressed, glazed, enamel, fancy, vitrified, sand-lime, and others. Not only do the plants here supply practically all of our own requirements in these products, but considerable quantities are shipped to contiguous territory and certain products are shipped over a much wider radius. We also include under this heading the various forms of hollow building 'tile' or blocks.

Plant of Los Angeles Brick and Clay Products Company, at Alberhill, Riverside County. *Photo by Walter W. Bradley*

Brick and hollow building tile were manufactured in California during 1943 in 34 plants in 16 counties, of which there was a total of 70,219 M of common brick, valued at $840,921; 40,265 M of fire brick, valued at $3,174,868; 3,451 M of glazed, pressed, vitrified, and fancy brick, valued at $138,456; and 16,947 tons of hollow building tile, valued at $214,430; the entire output having a total value of $4,368,675. The 1943 production showed a decrease in amount and value in all types of brick and building tile as compared with that of 1942, which was 117,739 M

of common brick, worth $1,296,449; 55,843 M of fire brick, worth $3,655,210; 7,353 M of glazed, pressed, fancy, and vitrified brick, worth $412,966; and 24,703 tons of hollow building tile, worth $344,342; with a total value of $5,708,967.

The 1943 output came from 12 plants in Los Angeles County; three in Contra Costa County; two each in Alameda, Amador, Sacramento, and San Joaquin counties; and one each in Humboldt, Kern, Orange, Placer, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, Santa Clara, and Tulare counties.

Brick and Hollow-Tile Production of California, by Years

Record of brick production in the State has been kept since 1893 by this Bureau, the figures for hollow building 'tile' or blocks being also included since 1914. The annual and total figures, for amount and value, are given in the following table:

Year	Brick, M	Hollow building blocks, tons	Value
1893	103,900		$801,750
1894	81,675		457,125
1895	131,772		672,360
1896	24,000		524,740
1897	97,468		563,240
1898	100,102		571,362
1899	125,950		754,730
1900	137,191		905,210
1901	130,766		860,488
1902	169,851		1,306,215
1903	214,403		1,999,546
1904	281,750		1,994,740
1905	286,618		2,273,786
1906	277,762		2,538,848
1907	362,167		3,438,951
1908	332,872		2,506,495
1909	333,846		3,059,929
1910	340,883		2,934,731
1911	327,474		2,638,121
1912	337,233		2,940,290
1913	358,754		2,915,350
1914	270,791		2,288,227
1915	180,538		1,678,756
1916	206,960		2,096,570
1917	192,269	29,348	2,532,721
1918	136,374	34,818	2,363,481
1919	156,328	36,026	3,087,067
1920	245,842	99,208	5,704,393
1921	238,022	67,100	5,570,875
1922	374,853	105,909	7,994,991
1923	397,754	122,534	9,738,082
1924	456,716	114,469	9,137,908
1925	361,094	105,491	7,503,976
1926	388,048	90,332	7,026,124
1927	374,111	75,116	6,516,077
1928	272,443	66,277	5,694,770
1929	327,011	66,713	5,607,410
1930	267,019	68,047	4,205,460
1931	151,545	51,988	2,560,415
1932	90,683	27,098	1,605,086
1933	76,905	25,814	1,520,481
1934	66,738	17,534	1,644,661
1935	76,521	21,309	1,855,343
1936	131,667	16,081	2,240,905
1937	148,333	17,521	3,083,902
1938	129,273	16,592	2,594,546
1939	150,503	16,283	3,063,660
1940	129,887	29,048	2,762,885
1941	137,925	16,513	3,598,797
1942	180,935	24,703	5,708,967
1943	113,935	16,947	4,368,675
Totals	$11,287,960	$1,378,819	$162,113,218

CEMENT

Bibliography: State Mineralogist Reports VIII, IX, XII, XIV, XV, XVII, XVIII, XXI-XXVIII (inc.), XXXII. Bulletin 38.

During 1943 the production of cement in California totaled 18,515,085 barrels, valued at $27,865,466 f.o.b. plant, of which 9,848,719 barrels, worth $14,971,871, came from mills in northern California and 8,666,366 barrels, worth $12,893,595, came from mills in southern California. The 1943 output was a decrease in both amount and value from that of 1942 which was the largest annual yield of cement ever recorded in the State and amounted to 23,306,578 barrels, worth $35,808,841.

Shipments of cement during 1943 were made by twelve plants in eleven counties to the extent of 17,804,421 barrels, valued at $27,500,347 f.o.b. plant, as compared with 23,732,414 barrels, worth $36,964,122, in 1942. During the year there were seven mills in northern California; one each in Calaveras, Contra Costa, Merced, San Benito, San Mateo, Santa Clara, and Santa Cruz counties, which shipped a total of 9,548,888 barrels, valued at $15,216,224; and five mills in southern California; two in San Bernardino County, and one each in Kern, Los Angeles,[1] and Riverside counties, which shipped a total of 8,255,533 barrels, valued at $12,284,123. There was an average of 2,725 men employed in the above mills during the year. The mill in San Benito County discontinued operation during the year. The annual capacity of California cement mills according to the U. S. Bureau of Mines,[2] was 27,690,000 barrels as of January, 1944, as compared with 27,540,000 barrels for January, 1943.

Cement Production of California, by Years

'Portland' cement was first commercially produced in California in 1891; though in 1860 and for several years following, a natural hydraulic cement from Benicia was utilized in building operations in San Francisco.

"The Benicia Cement Company in 1859-60 was turning out 50 to 100 barrels of cement a day and San Francisco was using about 12,000 barrels a year. The mill price of the product was then $4 a barrel. By 1865, the San Francisco rate of consumption had increased to 100,000 barrels yearly, brick buildings largely taking the place of frame structures, and the price of cement had fallen to $2.50 a barrel, about the same as it is today."[3]

The growth of the industry became rapid after 1902; since which time cement has continued to be an important factor in the industrial life of the State. Although the total cement figures, to date, are not of the same magnitude as those for gold and petroleum, it is interesting to note that the value of California's cement yield in the period 1920-1931 and 1942-1943 annually exceeded the value of her gold output.

[1] The plant in Los Angeles County grinds clinker coming from other counties, therefore the crude material is credited to the point of origin.

[2] U. S. Bureau of Mines, Monthly Cement Statement No. 272, Jan. 1944.

[3] Monthly Review of Mercantile Trust Co. of Calif., Vol. XIII, No. 3, p. 55, Mar. 1924.

Cement Production of California, by Years

Year	Barrels	Value	Year	Barrels	Value
1891	5,000	$15,000	1918	4,772,921	$7,969,909
1892	5,000	15,000	1919	4,645,289	8,591,990
1893			1920	6,709,160	14,962,945
1894	8,000	21,600	1921	7,404,221	18,072,120
1895	16,383	32,556	1922	8,962,135	16,524,056
1896	9,500	28,250	1923	10,825,405	25,999,203
1897	18,000	66,000	1924	11,655,131	23,225,850
1898	50,000	150,000	1925	13,206,630	25,043,335
1899	60,000	180,000	1926	13,797,173	25,269,678
1900	52,000	121,000	1927	14,661,733	26,474,935
1901	71,800	159,842	1928	13,625,231	24,463,287
1902	171,000	423,600	1929	12,794,729	21,038,565
1903	640,868	968,727	1930	9,831,938	14,575,731
1904	969,538	1,539,807	1931	7,693,712	11,510,655
1905	1,265,553	1,791,916	1932	5,657,549	7,967,107
1906	1,286,000	1,941,250	1933	7,284,031	10,331,395
1907	1,613,563	2,585,577	1934	8,936,085	12,445,616
1908	1,629,615	2,359,692	1935	8,086,292	10,210,721
1909	3,779,205	4,969,437	1936	13,300,188	18,314,589
1910	5,453,193	7,485,715	1937	12,072,062	16,546,229
1911	6,371,369	9,085,625	1938	10,561,037	15,502,574
1912	6,198,634	6,074,661	1939	10,984,033	15,616,219
1913	6,167,806	7,743,024	1940	13,955,255	17,673,202
1914	5,109,218	6,558,148	1941	19,531,608	26,248,694
1915	4,918,275	6,044,950	1942	23,306,578	35,808,841
1916	5,299,507	6,210,293	1943	18,515,085	27,865,466
1917	5,790,734	7,544,282			
			Totals	349,735,022	$552,278,854

GRANITE

Bibliography: State Mineralogist Reports X, XII-XXVI (inc.), XXVIII, XXXI, XXXV-XXXVII (inc.) Bulletin 38.

The 1943 output of granite in California had a total value of $148,160, as compared with a total value of $186,872 in 1942. The 1943 production was 30,100 cubic feet of monumental and building stone, valued at $140,410, the remainder being a small amount of curbing and some tuff, and volcanic rock used as building stone. The above came from two quarries each in Placer and San Diego counties, and one quarry each in Fresno, Lassen, Riverside, Sacramento, San Bernardino, and Sonoma counties. The material from Sonoma County was tuff.

In recent years there has been a steady decline in the production of granite and other building stone, due to the increase of concrete construction, which is steadily replacing stone.

Varieties

For building purposes, the granite found in California, particularly the varieties from Raymond in Madera County, Rocklin in Placer County and near Porterville in Tulare County, are unexcelled by any similar stone found elsewhere. The quantities available, notably at Raymond and Porterville, are unlimited. Most of California's 'granite,' particularly that found in the Sierra Nevada Mountains, is technically 'granodiorite' (that is, both plagioclase and orthoclase feldspars are present).

Granites of excellent quality for building and ornamental purposes are also quarried in Riverside, San Bernardino, and San Diego counties. Near Lakeside, San Diego County, there is a fine-grained, 'silver gray' granite of uniform texture and color, especially suited for monumental and ornamental work.

The Fresno County stone is a dark, hornblende diorite, locally called "black granite," whose color permits of a fine contrast of polished and unpolished surfaces, making it particularly suitable for monumental and decorative purposes. There is also similar 'black granite' in Tulare County, near Success.

Granite Production of California, by Years

The value of granite produced, annually, since 1887 has been as follows:

Year	Value	Year	Value
1887	$150,000	1916	$535,339
1888	57,000	1917	221,997
1889	1,329,018	1918	139,861
1890	1,200,000	1919	220,743
1891	1,300,000	1920	495,732
1892	1,000,000	1921	725,901
1893	531,322	1922	676,643
1894	228,816	1923	760,081
1895	224,329	1924	1,211,046
1896	201,004	1925	1,853,359
1897	188,024	1926	655,332
1898	147,732	1927	1,398,443
1899	141,070	1928	763,996
1900	295,772	1929	1,169,271
1901	519,285	1930	855,477
1902	255,239	1931	636,741
1903	678,670	1932	398,676
1904	467,472	1933	183,706
1905	353,837	1934	249,083
1906	344,083	1935	339,917
1907	373,376	1936	244,243
1908	512,923	1937	207,738
1909	376,834	1938	131,386
1910	417,898	1939	145,194
1911	355,742	1940	198,896
1912	362,975	1941	261,661
1913	981,277	1942	186,872
1914	628,786	1943	148,160
1915	227,928		
		Total value	$28,866,406

LIME

Bibliography: State Mineralogist Reports XIV, XV, XVII-XXIX (inc.), XXXIII-XXXV (inc.). Bulletin 38.

The early output of lime in California was used entirely for structural purposes. Later a small percent was put out for chemical, agricultural, and industrial uses and still later lime replaced limestone in metallurgy. In 1942 the structural use had decreased to such a point and other uses increased to where they required the largest part of the lime burnt in this State, so it was decided to include lime with 'industrial' limestone in this statistical report.

Lime Production of California, by Years

The following tabulation gives the amounts and value of lime produced in California by years since 1894 when compilation of such records was begun by the State Mining Bureau. The figures for

quantity have been recalculated from 'barrels,' as shown in the earlier reports, to 'tons' for the years 1894-1922 (inc.):

Year	Tons	Value	Year	Tons	Value
1894	37,350	$318,700	1919	42,070	$552,043
1895	39,776	386,094	1920	46,314	557,232
1896	30,275	261,505	1921	46,353	610,619
1897	28,780	252,900	1922	57,875	671,747
1898	29,786	254,010	1923	70,894	788,834
1899	29,985	314,575	1924	62,029	703,355
1900	31,252	283,699	1925	61,922	685,528
1901	31,738	334,688	1926	63,568	670,837
1902	44,866	369,616	1927	60,498	631,497
1903	49,659	418,280	1928	56,616	547,919
1904	57,945	571,749	1929	42,834	417,101
1905	61,700	555,322	1930	47,662	452,084
1906	68,927	763,060	1931	36,189	360,523
1907	68,422	756,376	1932	27,510	254,223
1908	39,639	379,243	1933	33,425	271,619
1909	52,075	577,824	1934	32,500	309,765
1910	47,951	477,683	1935	59,731	573,212
1911	42,959	390,988	1936	64,275	633,678
1912	52,212	464,440	1937	69,532	681,277
1913	61,344	528,547	1938	70,578	683,403
1914	43,996	378,663	1939	87,288	849,122
1915	35,653	286,304	1940	101,395	902,322
1916	49,364	390,475	1941	110,719	996,514
1917	50,073	311,380			
1918	43,684	461,315	Totals	2,481,288	$24,291,890

MAGNESITE

Bibliography: State Mineralogist Reports XII-XV (inc.), XVII-XXVII (inc.), XXX, XXXI, XXXIV, XXXVI-XXXVII. Bulletins 38, 79, 91. U. S. Geol. Surv., Bulletins 355, 540. Min. Res. 1913, Pt. II, pp. 450-453. Min. & Sci. Press, Vol. 114, p. 237. "Magnesite"—Hearings before Comm. on Ways and Means, House of Repr., on H. R. 5218, June 16, 17, and July 17, 1919. Eng. Soc. W. Penn., Proc. 1913, Vol. 29, pp. 305-388, 418-444. Eng. & Min. Jour.-Press, Vol. 114, July 29, and Dec. 2, 1922. U. S. Tariff Comm., "Crude and Caustic Calcined Magnesite. A Preliminary Statement of Information," May 19, 1926.

During 1943 magnesite was produced in California from a single property each in Alameda, Santa Clara, and Stanislaus counties, and reduced from salt-works bitterns at Newark, Alameda County. The annual details are concealed under the 'Unapportioned' item so as not to reveal the output of a single company. Practically all the above was shipped in the calcined form.

The 1942-1943 output of magnesite in California showed a total of 198,259 net tons of crude magnesite valued at $1,821,978, of which only a small amount was sold as such. Most of the material was calcined before being marketed. Operators reported a total of 74,099 tons calcined products valued at $2,991,681 f.o.b. rail shipping point was made during 1942-1943, and was deadburned for refractories and in part, material for the plastic trade.

In California the known deposits are mostly in the metamorphic rocks of the Coast Ranges and the Sierra Nevada, being associated

with serpentine areas. The notable exceptions are the sedimentary deposits at Bissell in Kern County and at Afton in San Bernardino County. Several thousand tons have been shipped from the Bissell deposit; and small shipments have been made from the Afton property. Beginning in 1938, a portion of the market for calcined magnesite is being supplied by magnesium oxide produced from salt-works bitterns at a plant at Newark, Alameda County, on San Francisco Bay. The figures for the crude of above tonnage are included under those for magnesium salts in the Salines chapter.

Total Magnesite Production of California

The first commercial production of magnesite in California was made in the latter part of 1886 from the Cedar Mountain district,[1] southeast of Livermore, Alameda County. Shipments amounting to 'several tons' or 'several carloads' were sent by rail to New York; but there is apparently no exact record of the amount for that first year. The statistical records of the State Mining Bureau began with the year 1887, and the table herewith shows the figures for amount and value, annually, from that time. Shipments of magnesite from Napa County began in 1891 from the Snowflake Mine; from the Red Mountain deposits in Santa Clara County, in 1899; and from Tulare County in 1900.

Total Magnesite Production of California

Year	Tons	Value	Year	Tons	Value
1887	600	$9,000	1916	154,052	$1,311,893
1888	600	9,000	1917	209,648	1,976,227
1889	600	9,000	1918	83,974	803,492
1890	600	9,000	1919	44,696	452,098
1891	1,500	15,000	1920	83,695	1,033,491
1892	1,500	15,000	1921	47,837	511,102
1893	1,093	10,930	1922	55,637	594,665
1894	1,440	10,240	1923	73,963	946,643
1895	2,200	17,000	1924	67,236	900,183
1896	1,500	11,000	1925	64,623	872,944
1897	1,143	13,671	1926	50,915	587,642
1898	1,263	19,075	1927	46,093	577,887
1899	1,280	18,480	1928	45,645	501,590
1900	2,252	19,333	1929	47,269	488,014
1901	4,726	43,057	1930	38,681	388,472
1902	2,830	20,655	1931	21,576	182,283
1903	1,361	20,515	1932*	40,303	282,325
1904	2,850	9,298	1933*		
1905	3,933	16,221	1934*	62,509	413,228
1906	4,032	40,320	1935*		
1907	6,405	57,720	1936*	94,491	734,443
1908	10,582	80,822	1937*		
1909	7,942	62,588	1938*	47,954	375,005
1910	16,570	113,887	1939*		
1911	8,858	67,430	1940*	241,620	2,069,220
1912	10,512	105,120	1941*		
1913	9,632	77,056	1942*	198,259	1,821,978
1914	11,438	114,380	1943*		
1915	30,271	283,461	Totals	1,970,639	$19,123,080

* Combined under 'Unapportioned.'

[1] See U. S. Geol. Surv.; Mineral Resources of U. S., 1886, pp. 6 and 696.

MARBLE

Bibliography: State Mineralogist Reports XII-XV (inc.), XVII-XXX (inc.), XXXIV, XXXV, XXXVII. Bulletin 38. U. S. Bur. of Mines Bull. 106.

In recent years the marble output has been showing a steady decline as has that of other building stone. The presence of artificial marbles and use of terrazzo which are cheaper is probably the major factor for this. During 1943 in California there was no production of marble reported. This being the first year since 1887, when the first record of the marble industry was made in this State, that there was no output .

California has many beautiful and serviceable varieties of marble, suitable for almost any conceivable purpose of construction or decoration. In the decorative class are deposits of onyx marble of beautiful coloring and effects. There is also serpentine marble suitable for electrical switchboard use.

Marble Production of California, by Years

Data on annual production since 1887, as compiled by the State Mining Bureau, follows. Previous to 1894 no records of amounts were preserved.

Total Production of Marble in California, by Years

Year	Cubic feet	Value	Year	Cubic feet	Value
1887		$5,000	1916	25,954	$50,280
1888		5,000	1917	24,755	62,950
1889		87,030	1918	[a]17,428	49,898
1890		80,000	1919	25,020	74,482
1891		100,000	1920	[b]29,531	92,899
1892		115,000	1921	30,232	98,395
1893		40,000	1922	38,321	127,792
1894	38,441	98,326	1923	28,015	124,919
1895	14,864	56,566	1924	[b]61,579	140,253
1896	7,889	32,415	1925	35,664	116,105
1897	4,102	7,280	1926	34,806	119,999
1898	8,050	23,594	1927	[b]42,308	103,689
1899	9,682	10,550	1928	[b]34,324	82,190
1900	4,103	5,391	1929	[b]72,881	93,661
1901	2,945	4,630	1930	[b]65,775	82,194
1902	19,305	37,616	1931	[b]37,776	81,760
1903	84,624	97,354	1932	[b]25,506	42,505
1904	55,401	94,208	1933	[b]9,039	23,178
1905	73,303	129,450	1934	[b]7,185	10,759
1906	31,400	75,800	1935	(b)	9,884
1907	37,512	118,066	1936	(b)	23,011
1908	18,653	47,665	1937	(b)	23,667
1909	79,600	238,400	1938	[a] (b)	6,015
1910	18,960	50,200	1939	(b)	14,822
1911	20,201	54,103	1940	(b)	15,189
1912	27,820	74,120	1941	(b)	14,448
1913	41,654	113,282	1942	(b)	580
1914	25,436	48,832	1943		
1915	22,186	41,518	Total value		$3,568,420

[a] Includes onyx and serpentine.
[b] Includes onyx and travertine.

ONYX AND TRAVERTINE

Bibliography: State Mineralogist Reports XII-XV (inc.), XVII, XVIII, XXI, XXIII, XXXI, XXXIV. Bulletin 38.

Onyx and travertine are known to exist in a number of places in California, but there has been only a small and irregular production since the year 1896. In 1942 there was one producer of travertine in Solano County. In 1942 output showed a decrease in both quantity and value from that of 1941, the figures of which are combined with marble. This material is used in terrazzo and for ornamental purposes.

Onyx Production of California, by Years

Production by years has been as follows:

Year	Value	Year	Value
1887	*	1926	$7,575
1888	$900	1927	*
1889	900	1928	*
1890	900	1929	*
1891	1,500	1930	*
1892	2,400	1931	*
1893	1,800	1932	*
1894	27,000	1933	*
1895	20,000	1934	*
1896	12,000	1935	*
1918	24,000	1936	*
1919	*	1937	*
1920		1938	*
1921	1,294	1939	*
1922	3,320	1940	*
1923	2,510	1941	*
1924	*	1942	*
1925	16,120	1943	
		Total value	$122,219

* See under Marble.

SANDSTONE

Bibliography: State Mineralogist Reports XII-XV, XVII, XVIII, XXI, XXIII, XXVI-XXVIII (inc.), XXXIV, XXXV. Bulletin 38. U. S. Bur. of Mines, Bull. 124.

An unlimited amount of high-grade sandstone is available in California, but the wide use of concrete in buildings of every character, as well as the popularity of a lighter-colored building stone, has curtailed production in this branch of the mineral industry during recent years almost to the vanishing point. During 1943 sandstone as reported in California came from two quarries in Monterey County. The annual details are concealed under the 'Unapportioned' item so as not to reveal the output of either producer. In 1942 there was a total of 1,532 tons or about 20,427 cu. ft. of sandstone produced in California valued at $8,587 at the quarry and came from two properties in Monterey County; and one each in Colusa, Los Angeles, Napa, San Bernardino, San Luis Obispo, and Shasta counties.

Practically all of the material was flagstone which is used in garden walks, fountains, walls and fireplaces to give effect to Spanish and English types of homes. The material reported from Monterey and San Luis Obispo counties is in reality an indurated shale of the Monterey series, of a cream color and utilized as a building stone.

Sandstone Production of California, by Years

Amount and value, so far as contained in the records of this Bureau, are presented herewith, with total value from 1887 to date:

Year	Cubic feet	Value	Year	Cubic feet	Value
1887		$175,000	1916	17,270	$10,271
1888		150,000	1917	31,090	7,074
1889		175,598	1918	900	400
1890		100,000	1919	5,400	3,720
1891		100,000	1920	10,500	2,300
1892		50,000	1921	10,150	2,112
1893		26,314	1922	900	1,100
1894		113,592	1923	7,000	13,000
1895		35,373	1924	6,700	3,600
1896		28,379	1925	14,704	14,362
1897		24,086	1926	34,100	17,500
1898		46,384	1927	222,900	205,400
1899	56,264	103,384	1928	134,100	43,250
1900	378,468	254,140	1929	177,655	49,881
1901	266,741	192,132	1930	160,704	56,404
1902	212,123	142,506	1931	110,244	30,960
1903	353,002	585,309	1932	41,793	13,286
1904	363,487	567,181	1933	25,980	10,888
1905	302,813	483,268	1934	21,738	14,245
1906	182,076	164,068	1935	38,426	9,268
1907	159,573	148,148	1936	24,705	9,180
1908	93,301	55,151	1937	73,190	15,680
1909	79,240	37,032	1938	43,107	9,384
1910	165,971	80,443	1939	54,380	12,494
1911	255,313	127,314	1940	27,992	13,083
1912	66,487	22,574	1941	60,958	13,143
1913	62,227	27,870	1942	20,427	8,587
1914	111,691	45,322	1943	*	*
1915	63,350	8,438			
			Totals		$4,659,478

* Under 'Unapportioned.'

SERPENTINE

Bibliography: State Mineralogist Report XV. Bulletin 38.

Serpentine has not been produced in California to a very large extent at any time. A single deposit, that on Santa Catalina Island, has yielded the principal output to date. Some material was shipped from there in 1917 and 1918, being the only output recorded since 1907. It was used for decorative building purposes and for electrical switchboards. As there was but a single operator, the figures were combined with those of marble output for those years.

The production of serpentine prior to 1919 was 'verde antique' which is used as an ornamental stone and often classed as a marble. In recent years experimental tests have proved several possible commercial applications to which this mineral might be put such as an admix in cement, in the manufacture of magnesium chemicals, in terrazzo, as a substitute for soapstone, and as a filler. During 1938 there was a small shipment of serpentine from one property in San Bernardino County. The annual details are concealed in the 'Unapportioned' item so as not to reveal the output of an individual.

Serpentine Production of California, by Years

The following table shows the amount and value of serpentine from 1895 as recorded by this bureau:

Serpentine Production in California, by Years

Year	Cubic feet	Value	Year	Cubic feet	Value
1895	4,000	$4,000	1905		
1896	1,500	6,000	1906	847	$1,694
1897	2,500	2,500	1907	1,000	3,000
1898	750	3,000	1917	[a]	[a]
1899	500	2,000	1918	[b]	[b]
1900	350	2,000	1919		
1901	89	890	1938	[b]	[b]
1902	512	5,065			
1903	99	800			
1904	200	2,310	Totals	12,347	$33,259

[a] Under 'Unapportioned.'
[b] See under Marble.

SLATE

Bibliography: State Mineralogist Reports XV, XVIII, XXIV, XXVIII, XXXIV. Bulletin 38. U. S. Geol. Surv., Bull. 586. U. S. Bur. of Mines, Bull. 218.

Slate was first produced in California in 1889. Up to and including 1910 such production was continuous, but since then it has been irregular. Large deposits of excellent quality are known in the State, especially in El Dorado, Calaveras and Mariposa counties, but the demand has been light owing principally to competition of cheaper roofing materials.

As the 1943 slate output in California came from a single property in El Dorado County, the annual details are concealed under the 'Unapportioned' item so as not to reveal the production of an individual. The 1943 production showed an increase in both amount and value over that of 1942. The 1941 and 1942 slate output totaled 16,596 tons valued at $80,321.

Total Production of Slate in California

A complete record of amount and value of slate produced in California follows:

Year	Squares	Value	Year	Squares	Value
1889	4,500	$18,089	1916		
1890	4,000	24,000	1920	8	$80
1891	4,000	24,000	1921		
1892	3,500	21,000	1922	200	2,400
1893	3,000	21,000	1923		
1894	1,800	11,700	1926	[a]	7,371
1895	1,350	9,450	1927	[b]2,686	17,960
1896	500	2,500	1928	[b]4,075	31,263
1897	400	2,800	1929		
1898	400	2,800	1930 *	[b]8,220	71,347
1899	810	5,900	1931		
1900	3,500	26,250	1932 *	[b]8,234	55,182
1901	5,100	38,250	1933	[b]5,343	31,958
1902	4,000	30,000	1934	[b]5,065	24,245
1903	10,000	70,000	1935	[a]	40,912
1904	6,000	50,000	1936	[a]	49,818
1905	4,000	40,000	1937	[a]	32,572
1906	10,000	100,000	1938	[b]6,871	30,281
1907	7,000	60,000	1939	[b]5,777	28,327
1908	6,000	60,000	1940	[b]4,777	18,031
1909	6,961	45,660	1941		
1910	1,000	8,000	1942 *	[b]16,596	80,321
1911			1943	*	*
1915	1,000	5,000	Totals		$1,203,467

* Annual details concealed under 'Unapportioned.'
[a] Quantity not shown as both 'squares' and 'tons' included.
[b] Tons.

MISCELLANEOUS STONE

Bibliography: State Mineralogist Reports XII-XXVIII (inc.), XXXI-XXXII, XXXV-XXXVII. Bulletin 38; also annual statistical bulletins from 1915 to date.

'Miscellaneous stone' is the name used throughout this report as the title for that branch of the mineral industry covering crushed rock of all kinds, paving blocks, sand and gravel, and pebbles for grinding mills. The foregoing are very closely related from the standpoint of the producer; therefore it has been found to be most satisfactory to group these items as has been done in recent reports of this Bureau. So far as it has been possible to do so, crushed rock production has been subdivided into the various uses to which the product was put. It will be noted, however, a very large percentage of the output has been tabulated under the heading 'Unclassified.' This is necessary because of the fact that many of the producers have no way of telling to what specific use their rock was put (or at least the proportions to each use) after they have quarried and sold the same to distributors and contractors.

In addition to amounts produced by commercial firms, both corporations and individuals, there is hardly a county in the State but uses more or less gravel and broken rocks on its roads. Of much of this, particularly in the country districts, there is no definite record kept.

During 1943 there was a total of 32,599,456 net tons of miscellaneous stone, including sand, gravel, crushed rock, rubble and riprap produced in California and having a value of $21,716,223, as compared with 45,455,085 tons worth $27,281,342 in 1942. The 1942 output was the largest in both amount and value ever reported in this State. Alameda County led all other counties in 1943 as to value of miscellaneous stone, which was worth $3,359,657, and passing Los Angeles County which had led for years; Los Angeles County second with an output worth $2,808,592; Shasta County third with an output worth $2,259,567; followed in turn by San Diego, Contra Costa, Sacramento counties all with outputs worth over a million dollars. Under this heading every county in the State contributed with the exception of Kings and Sutter counties in 1943.

Paving Blocks

The 1943 output of paving blocks came from a single quarry in Sacramento County. The annual details are concealed under the 'Unapportioned' item so as not to reveal production of either operator.

The paving block industry has decreased materially of recent years, practically to the vanishing point, because of the increased construction of smoother pavements demanded by motor vehicle traffic. The blocks made on Solano County were of basalt; those from Sonoma were of basalt, andesite, and some trachyte, while those from Madera, Placer, Riverside, San Bernardino, and San Diego were of granite; and those from San Mateo County were of a sandstone.

The amount and value of paving block production, annually, since 1887 has been as follows:

Year	Amount M	Value	Year	Amount M	Value
1887	*10,000	$350,000	1915	3,285	$171,092
1888	10,500	367,500	1916	1,322	54,362
1889	7,303	297,236	1917	938	38,567
1890	7,000	245,000	1918	372	17,000
1891	5,000	150,000	1919	27	1,350
1892	*3,000	96,000	1920	63	3,155
1893	2,770	96,950	1921	4	280
1894	2,517	66,981	1922	72	3,924
1895	2,332	73,338	1923	15	880
1896	4,161	77,584	1924	11	935
1897	1,711	35,235	1925	27	1,350
1898	1,144	21,725	1926		
1899	305	7,861	1927	41	2,057
1900	1,192	23,775	1928	25	1,658
1901	1,920	41,075	1929		
1902	3,502	112,437	1930		
1903	4,854	134,642	1931 [a]	66	5,900
1904	3,977	161,752	1932		
1905	3,408	134,347	1934	2	75
1906	4,203	173,432	1935		
1907	4,604	199,347	1938		
1908	7,660	334,780	1939 [a]	9	439
1909	4,503	199,803	1940		
1910	4,434	198,916	1941 [a]	155	30,862
1911	4,141	210,819	1942		
1912	11,018	578,355	1943 [a]	5	201
1913	6,364	363,505			
1914	6,053	270,598	Totals	136,009	$5,357,134

* Figures for 1887-1892 (inclusive) are for Sonoma County only, as none are available for other counties during that period though Solano County quarries were then also quite active.
[a] Annual details concealed under 'Unapportioned.'

Grinding-Mill Pebbles

The 1943 output of grinding mill pebbles in California came from a single property in San Diego County. The annual details are combined under the 'Unapportioned' item so as not to reveal the output of an individual. The 1942 production was a decrease in amount and value as compared with that of 1941 which came from two properties in San Diego County and one in Calaveras County.

The amount and value of grinding-mill pebbles, annually, follows:

Year	Tons	Value	Year	Tons	Value
1915	340	$2,810	1931		
1916	20,232	107,567	1932 *	25	$211
1917	21,450	90,538	1933		
1918	8,628	61,268	1934 *	300	3,018
1919	2,607	19,272	1935		
1920	2,104	17,988	1936 *	961	8,356
1921	247	1,418	1937		
1922	1,571	7,628	1938 *	960	4,800
1923	2,650	14,936	1939		
1924	434	2,969	1940 *	482	982
1925	215	1,385	1941		
1926	102	612	1942 *	573	2,650
1927	288	1,800	1943	*	*
1928	372	2,408			
1929			Totals	64,707	$283,841
1930 *	166	1,225			

* Annual details concealed under 'Unapportioned.'

Sand and Gravel

A considerable part of the gravel excavated is passed through grading and washing plants, and the material over 2 inches in size is crushed. Much of it is utilized in concrete mixtures. Most of the gravel used for road surfacing and repairs as well as that for railroad ballast is creek-run or pit-run material which is spread upon the roads without undergoing any grading or washing.

The 1943 sand and gravel output totaled 21,672,727 net tons valued at $13,726,756, compared with 27,796,566 tons worth $15,295,252 in 1942.

Included in the above total for 1943 are 80,297 net tons of molding sand valued at $316,577 which came from one property each in Contra Costa, Orange, Riverside, Sacramento, San Diego, San Luis Obispo, San Mateo, and Ventura counties. The 1943 output of molding sand showed an increase in both amount and value over that of 1942, which was 80,026 tons worth $279,383.

The distribution of the 1943 output of sand and gravel by counties is as follows:

County	Sand and gravel	
	Tons	Value
Alameda	3,289,149	$2,336,936
Amador	65,778	26,426
Butte	27,755	17,675
Colusa	241,323	69,363
Contra Costa[a]	467,683	376,747
Del Norte	45,405	27,537
Fresno	194,491	172,471
Glenn	122,840	68,113
Humboldt	214,401	153,846
Imperial	92,810	99,452
Inyo	11,851	5,870
Kern	224,970	167,285
Kings	72,078	72,175
Lake	43,595	15,415
Lassen	31,901	25,003
Los Angeles	4,438,219	1,946,040
Mendocino	91,546	42,909
Modoc	31,173	21,213
Mono	4,505	3,665
Monterey	357,583	587,218
Napa	39,200	20,067
Nevada	3,155	2,116
Orange[a]	646,342	426,860
Placer	23,923	21,267
Plumas	84,840	55,340
Riverside [a, b, c]	307,787	195,772
Sacramento[a]	672,593	602,672
San Bernardino	1,105,932	839,117
San Diego [a, b, c]	1,058,007	1,082,912
San Joaquin	514,552	368,829
San Luis Obispo[a]	58,251	77,412
Santa Barbara	294,441	292,210
Santa Clara	194,367	118,518
Shasta	2,992,607	1,234,909
Siskiyou	74,898	50,412
Solano	43,129	43,315
Stanislaus	969,520	394,486
Trinity	39,635	32,189
Tulare	91,866	81,188
Ventura[a]	417,015	217,835
Yolo	100,133	38,653
Yuba	250,133	189,870
Alpine, Calaveras, El Dorado, Madera, Marin, Mariposa, Merced, San Benito, San Mateo[a], Santa Cruz, Sierra, Sonoma, Tehama, Tuolumne[a]	1,621,048	1,103,648
Totals	21,672,727	$13,726,756

[a] Combined to conceal output of producers in each.
[a] Includes molding sand.
[b] Includes filter sand.
[c] Includes blast sand.

Crushed Rock Production by Counties for 1943

	Macadam and ballast		Rubble and riprap		For concrete		Unclassified		Totals	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value	Tons	Value
Alameda	130,579	$129,219	*	*	50,047	$46,772	[a]1,389,082	$846,330	1,569,708	$1,022,321
Calaveras	69,579	77,746							69,579	77,746
Contra Costa	132,104	126,758	*	*	*	*	753,560	590,375	885,664	717,133
Fresno	44,015	25,535					*	*	44,015	25,535
Los Angeles	[a]349,396	184,618	*	*			[a]1,468,217	641,476	1,817,613	826,094
Nevada	9,662	12,087							9,662	12,087
Plumas	36,610	25,130	11,700	$11,077					48,310	36,207
Sacramento	117,947	123,059	545	218			506,570	356,478	625,062	479,755
San Joaquin							67,587	39,475	67,587	39,475
Santa Clara	183,628	99,089			*	*	*	*	183,628	99,089
Shasta	[b]132,965	102,258	*	*	*	*	*	*	132,965	102,258
Tuolumne	8,970	8,835							8,970	8,835
Ventura					81,999	34,550			81,999	34,550
Butte, Humboldt, Marin, Modoc, Napa, Orange[a], Riverside, San Diego, San Mateo, Santa Barbara, Siskiyou [c], Sonoma, Trinity, Stanislaus, Yuba*	847,729	599,686							847,729	599,686
Alameda, Contra Costa, El Dorado, Los Angeles, Marin, Napa, Placer, Riverside, San Diego, San Mateo, Santa Cruz, Shasta, Sonoma, Stanislaus, Trinity, Yuba*			638,923	736,602					638,923	736,602
Butte, Contra Costa, El Dorado, Kern, Napa, Riverside, San Bernardino, San Diego, San Mateo, Santa Clara, Shasta, Stanislaus*					1,230,025	1,573,927			1,230,025	1,573,927
Butte, Del Norte, Fresno, Humboldt, Kern, Marin, Mendocino, Monterey[a], Orange, Riverside, San Bernardino[d], San Diego[d], San Francisco, San Mateo, Santa Clara, Shasta, Solano, Sonoma*							2,665,290	1,598,167	2,665,290	1,598,167
Totals	2,063,184	$1,514,020	651,168	$747,897	1,362,071	$1,655,249	6,850,306	$4,072,301	10,926,729	$7,989,467

* Combined to conceal the output of operators in each.
[a] Includes decomposed granite.
[b] Includes slag.
[c] Includes volcanic cinders.
[d] Includes granules for roofing and terrazzo.

Crushed Rock

To list the kinds and varieties of rock utilized commercially under this heading would be to run almost the entire gamut of the classification scale. Much depends on the kind available in a given district. Those which give the most satisfactory service are the basalts and other hard, dense, igneous rocks which break with sharp, clean edges. In many localities, river-wash boulders form an important source of such material. In such cases, combined crushing and washing plants obtain varying amounts of sand and gravel along with the crushed sizes. In Sacramento and Butte counties the tailings piles from the gold dredgers are the basis of like operations.

The values given are based on selling price f.o.b. car, barge or truck at the quarry. The 1943 output amounted to a total of 10,926,729 tons valued at $7,989,467, as compared with 17,659,519 tons valued at $11,986,090, for 1942. The accompanying table gives the breakdown of crushed rock by counties for 1943.

Miscellaneous Stone Production of California, by Years

The amount and value, annually, of crushed rock (including macadam, ballast, rubble, riprap, and that for concrete), and sand and gravel, since 1893, follow:

Crushed Rock, Sand and Gravel, by Years

Year	Tons	Value	Year	Tons	Value
1893	371,000	$456,075	1919	6,919,188	$3,678,322
1894	661,900	664,838	1920	9,792,122	6,782,414
1895	1,254,688	1,095,939	1921	10,914,145	7,834,640
1896	960,619	839,384	1922	13,049,644	10,366,231
1897	821,123	600,112	1923	19,840,301	15,379,838
1898	1,177,365	814,477	1924	21,451,129	15,962,476
1899	964,898	786,892	1925	23,819,137	17,407,113
1900	789,287	561,642	1926	24,987,606	19,859,261
1901	530,396	641,037	1927	25,126,691	18,912,994
1902	2,056,015	1,249,529	1928	27,471,794	17,328,044
1903	2,215,625	1,673,591	1929	27,104,618	17,840,159
1904	2,296,898	1,641,877	1930	23,514,168	16,430,027
1905	2,624,257	1,716,770	1931	15,848,313	11,848,531
1906	1,555,372	1,418,406	1932	11,361,564	7,183,643
1907	2,288,888	1,915,015	1933	11,181,156	6,871,581
1908	3,998,945	3,241,774	1934	16,148,275	7,131,330
1909	5,531,561	2,708,326	1935	9,041,876	5,571,041
1910	5,827,828	2,777,690	1936	28,528,079	16,578,238
1911	6,487,223	3,610,357	1937	28,254,740	16,917,633
1912	8,044,937	4,532,598	1938	19,051,677	11,734,038
1913	9,817,616	4,823,056	1939	18,693,896	10,316,787
1914	9,288,397	3,960,973	1940	24,184,186	12,181,564
1915	10,879,497	4,609,278	1941	34,626,035	19,559,883
1916	9,951,089	4,009,590	1942	45,455,085	27,281,342
1917	8,069,271	3,505,662	1943	32,599,432	21,716,223
1918	6,641,144	3,325,889	Totals	614,070,720	$399,854,680

A comparison of the above table of annual production of these materials with the similar table for cement (see *ante*) reveals the fact that the important growth of the crushed rock and gravel business was coincident with the rapid development of the cement industry from the year 1902.

CHAPTER FIVE

INDUSTRIAL MATERIALS

Bibliography: State Mineralogist Reports XII-XXXVII (inc.). Bulletin 38. Min. & Sci. Press, Vol. 114, March 10, 1917. Spurr and Wormser, "Marketing of Metals and Minerals." "Non-Metalic Minerals," by R. B. Ladoo. "Industrial Minerals and Rocks," A. I. M. E., 1937. See also under each substance.

The following mineral substances have been arbitrarily arranged under the general heading of 'Industrial Materials,' as distinguished from those which have clearly a defined classification, such as metals, salines, structural materials, etc.

These materials, many of which are mineral earths, are, with four or five exceptions, as yet produced on a comparatively small scale. The possibilities of development along several of these lines are large, and with increasing transportation and other facilities, together with steadily growing demands, the future for this branch of the mineral industry in California is promising. There is scarcely a county in the State but might contribute to the output.

Up to within the last few years, at least, production has been in the majority of instances dependent upon more or less of a strictly local market, and the annual tables show the results of such a condition, not only in the widely varying amounts of a certain material produced from year to year, but in widely varying prices of the same material.

The more important of these minerals thus far exploited, so far as shown by value of the output, are barytes, bentonite (fuller's earth), pottery clay, diatomite, dolomite, gypsum, limestone, mineral water, pumice and volcanic ash, pyrite, silica, and soapstone and talc.

In 1937 the mineral zircon was added to this group. The material mined was used as an abrasive and a refractory.

This group as a whole showed an increase in total value from $8,606,428 in 1942 to $10,656,288 in 1943.

The following table gives the comparative figures for the amounts and value of industrial minerals produced in California during the years 1942 and 1943:

Substance	1942		1943		Increase+ Decrease— Value
	Amount	Value	Amount	Value	
Asbestos	8,319 lbs.	$836	*	*	——+
Bentonite	7,453 tons	67,503	11,480 tons	$118,257	$50,754—
Carbon dioxide	193,143 M. cu.ft.	310,000	227,424 M. cu.ft.	248,126	61,874—
Clay (pottery)	622,958 tons	1,200,293	622,019 tons	1,185,240	150,053—
Dolomite	142,552 tons	413,469	331,251 tons	472,756	59,287+
Gem Material		570		329,868	329,298+
Gypsum	425,268 tons	791,892	495,967 tons	916,883	124,991+
Limestone	474,764 tons	1,155,352	495,262 tons	1,378,647	223,295+
Mineral water	17,559,686 gals.	567,897	22,022,314 gals.	814,700	246,803+
Pumice and volcanic ash	55,603 tons	209,539	21,154 tons	142,665	66,874—
Silica (quartz and glass sand)	193,174 tons	692,762	161,318 tons	533,434	159,328—
Soapstone and talc	47,782 tons	545,509	63,012 tons	723,056	177,547+
Unapportioned		[a]2,650,806		[b]3,792,656	1,142,228+
Total values		$8,606,428		$10,656,288	
Net increase					1,926,716

* Included under 'Unapportioned.'

[a] Includes barite, diatomite, feldspar, lithium salts, mineral paint, pyrite, sillimanite group, and sulphur.

[b] Includes asbestos, barite, diatomite, feldspar, lithia minerals, mineral paint, pyrite, sillimanite-andalusite kyanite group, strontium minerals.

ASBESTOS

Bibliography: State Mineralogist Reports XII-XIX (inc.), XXII, XXVII (inc.), XXIX, XXXI-XXXII, XXXIV-XXXVII (inc.). Bulletins 38, 91. Canadian Dept. of M., Mines Branch Bulletin 69. Min. and Sci. Press, April 10, 1920, pp. 531-533. Eng. & Min. Jour.-Press, Vol. 113, pp. 617-625, 670-677. Asbestology, Vol. 5, No. 7, July, 1927.

During 1943 there was a production of asbestos in California coming from a single property each in Napa and Placer counties. The annual details are concealed under the 'Unapportioned' item so as not to reveal the output of either producer. The 1943 output was a marked increase over that of 1942 which totaled 8,319 pounds worth $836, which also came from Napa and Placer counties.

Of the 1942 and 1943 outputs, that from Napa County was the chrysotile variety and that from Placer and Shasta counties was tremolite asbestos.

There are two varieties of asbestos, amphibole and serpentine. The most valuable and widely used is the serpentine or chrysotile variety. Chrysotile asbestos has short strong fibers varying in length from $\frac{1}{8}$ of an inch to three inches but mostly less than one inch. The value of the material varies greatly as to the length of the fiber; the longer demanding a premium. It is used as insulation for heat and electricity, in brake linings, steam packing, pipe coverings, in paint, waterproof paper roofing, cement, stucco, and plasters, in heat resisting textiles, as gloves, curtains, cord, etc.

The amphibole variety may be any one of several minerals of the amphibole group. The fibers of this type are weak and often brittle, and they are much more abundant but their uses are limited and value small, being restricted to heat insulation, chemical filters, and sometimes as a filler.

Asbestos Production of California, by Years

Total amount and value of asbestos production in California since 1887, as given in the records of this Bureau, are as follows:

Year	Tons	Value	Year	Tons	Value
1887	30	$1,800	1914	51	$1,530
1888	30	1,800	1915	143	2,860
1889	30	1,800	1916	145	2,380
1890	71	4,260	1917	136	10,225
1891	66	3,960	1918	229	9,903
1892	30	1,830	1919		
1893	50	2,500	1920	* 131	6,240
1894	50	2,250	1921	410	19,275
1895	25	1,000	1922	50	1,800
1896			1923	20	200
1897			1924	70	4,750
1898	10	200	1925		
1899	30	750	1926	* 25	1,650
1900	50	1,250	1927		
1901	110	4,400	1928	* 13	1,160
1902			1929		
1903			1930	* 219	6,175
1904	10	162	1931		
1905	112	2,625	1932		
1906	70	3,500	1934	* 309	3,274
1907	70	3,500	1935		
1908	70	6,100	1936		
1909	65	6,500	1941	16	2,867
1910	200	20,000	1942	4	836
1911	125	500	1943	*	*
1912	90	2,700			
1913	47	1,175	Totals	3,412	$149,687

* Annual details concealed under 'Unapportioned.'

BARITE

Bibliography: State Mineralogist Reports XXII, XIV, XV, XVII, XXI-XXVIII (inc.), XXXIV-XXXV (inc.), XXXVII. Bulletins 38, 87. Eng. & Min. Jour.-Press, Vol. 114, p. 109, July 15, 1922; Vol. 115, pp. 319-324, Feb. 17, 1923. U. S. Bureau of Mines, inform. Circ. 6221, 6223.

During 1943 the barite (including some witherite) produced in California came from three properties, one each in Mariposa and Nevada counties, the annual details being concealed in the 'Unapportioned' items so as not to reveal the output of either operator. This material was consumed in the manufacture of lithopone, a heavy-gravity oil-well drilling-mud, fillers, and barium chemicals.

The 1943 output showed a decrease in value as compared with that of 1942. Commercial production of barite for the years 1942 and 1943 totaled 53,625 net tons valued at $311,910.

Barite's largest use in the United States is in the manufacture of lithopone, which is a chemically-prepared white pigment containing approximately 70% barium sulphate and 30% zinc sulphide. This is one of the principal constituents of 'flat' wall paints. Other important uses for barite, after washing and grinding, are as an inert pigment and filler in paint, paper, linoleums, oilcloth and rubber manufacture, and in the preparation of a number of chemicals including barium binoxide, carbonate, chloride, nitrate, the sulphate precipitated, or 'blanc fixe,' and in medicine.

Present (Aug. 10, 1944) quotations for barite (95% $BaSO_4$) vary from $8.50 to $9.00 per ton, crude, f.o.b. rail shipping point. Most barite

has to be washed and acid treated to remove iron stains or other impurities before being suitable for paint use.

Known occurrences of this mineral in California are located in Inyo, Los Angeles, Mariposa, Monterey, Nevada, San Bernardino, Shasta, Santa Barbara and Tulare counties. The deposit at El Portal, in Mariposa County, has given the largest commercial production to date, in part witherite (barium carbonate, $BaCO_3$). Witherite has also been found in Shasta County, but no shipments have yet been made from the deposit. The carbonate is especially desirable, as it is a simpler and hence a cheaper source for preparation of barium chemicals, notably the nitrate which is used in priming mixture for incendiary bombs.

Total Barite Production of California

The first recorded production of barite in California, according to the statistical reports of the State Mining Bureau, was in 1910. The annual figures are as follows:

Year	Tons	Value	Year	Tons	Value
1910	860	$5,640	1927	17,993	$90,617
1911	309	2,207	1928	13,406	55,888
1912	564	2,812	1929	26,796	168,829
1913	1,600	3,680	1930	19,783	133,107
1914	2,000	3,000	1931	27,832	156,647
1915	410	620	1932	8,507	49,409
1916	1,606	5,516	1933	8,405	49,595
1917	4,420	25,633	1934	21,769	125,514
1918	100	1,500	1935	22,979	133,810
1919	1,501	18,065	1936		
1920	3,029	20,795	1937	*	
1921	901	4,809	1938	41,882	245,392
1922	3,370	18,925	1939	*	
1923	2,925	16,058	1940	66,228	396,218
1924			1941	*	
1925			1942	57,728	377,229
1926	4,798	38,165	1943	*	
				53,625	311,910
			Totals	415,506	$2,461,600

* Annual details concealed under 'Unapportioned.'

BENTONITE (Fuller's Earth)

Bibliography: State Mineralogist Reports XIV, XVII, XVIII, XXI, XXIII, XXV-XXVI (inc.), XXXIV, XXXVI-XXXVII. Bulletins 83, 91. U. S. Bureau of Mines, Bulletin 71, Technical Paper 609. Eng. & Min. Jour.-Press, Vol. 121, pp. 837-842, May 22, 1926.

Bentonite produced in California during 1943 amounted to a total of 11,480 net tons, valued at $118,257, and came from two properties in San Bernardino County; and one each in Kern and San Diego counties. The 1943 output showed an increase in amount and value as compared with that of 1942, which was 7,453 tons, worth 67,503, and came from four properties in San Bernardino County, two in Inyo County, and one each in Kern and San Diego counties.

Previous to 1931 the Division of Mines classed this material under the heading of 'fuller's earth,' but it was thought advisable to change the name to bentonite, owing to the fact that much bentonite is employed in uses that can not be classed as fuller's earth and therefore had been classified in these reports under pottery clay. This was somewhat con-

fusing. Bentonite is the name commonly applied to the clays of the montmorillonite and halloysite group ('rock soap').

Fuller's earth includes many kinds of unctuous clays. It is usually soft, friable, earthly, nonplastic, white and gray to dark green in color, and some varieties disintegrate in water. Production has come mainly from Calaveras and Solano counties, with other deposits noted also in Riverside, Fresno, Inyo and Kern counties.

Bentonite Production of California, by Years

Bentonite including a small amount of fuller's earth was first produced commercially in this State in 1899, and the total amount and value of the output since that time are as follows:

Year	Tons	Value	Year	Tons	Value
1899	620	$12,400	1922	6,606	$48,756
1900	500	3,750	1923	3,650	55,125
1901	1,000	19,500	1924	5,290	67,295
1902	987	19,246	1925	5,280	91,842
1903	250	4,750	1926	23,552	250,192
1904	500	9,500	1927	13,018	154,764
1905	1,344	38,000	1928	53,232	501,743
1906	440	10,500	1929	15,541	170,563
1907	100	1,000	1930	12,522	177,964
1908	50	1,000	1931	13,960	222,583
1909	459	7,385	1932	4,295	57,670
1910	340	3,820	1933	4,605	60,621
1911	466	5,294	1934	6,168	69,325
1912	876	6,500	1935	10,204	68,372
1913	460	3,700	1936	10,185	165,131
1914	760	5,928	1937	8,425	140,261
1915	692	4,002	1938	9,374	113,164
1916	110	550	1939	11,284	138,864
1917	220	2,180	1940	10,360	174,002
1918	37	333	1941	18,369	164,582
1919	385	3,810	1942	7,453	67,503
1920	600	6,000	1943	11,480	118,257
1921	1,185	8,295			
			Totals	260,333	$2,591,923

CALCIUM SILICATE

Bibliography: State Mineralogist Report XXXIV, Mining and Metallurgy: Oct., 1935.

During 1943 no output of calcium silicate was reported in California but in 1941 one property in Kern County made some shipments to their mineral wool plant.

The annual details are concealed in the 'Unapportioned' item so as not to reveal its output.

The first commercial production of wollastonite was made in 1933 from a deposit operated by John T. Thorndyke in the Radamacher District in Kern County, and was shipped from Code's Siding to Los Angeles, where it is used to manufacture mineral wood. This was done by a new process in an electric furnace where the material is melted without the use of a flux and then blown to a fine fiber or wool by compressed air from jets. Mineral wool is an excellent insulating material for sound, heat and cold, and the manufacturer expects to use large quantities in proposed steel houses. This material, also, can be used in the manufacture of unbreakable glass. Experiments being conducted for several years by Mr. A. M. M. Russell, Testing Engineer of the State

Harbor Commission, shows that wollastonite increases the strength of concrete.

Pyroxene is a silicate of calcium and magnesium and is found in crystalline limestone near the contact with intrusive igneous rocks and in basic igneous rocks such as gabbros. It is white to various shades of green, brown to black, having a hardness of 5 to 6 and a specific gravity 3.2 to 3.6.

Wollastonite is a calcium metasilicate ($CaSiO_3$) and usually found in crystalline limestone at the contact with intrusive igneous rocks. It is a white to gray mineral, having a hardness of 4½ to 5 and a specific gravity of about 2.9.

Calcium silicate from 1934 to 1936 was classed in these California mineral production reports as wollastonite.

CARBON DIOXIDE GAS

Bibliography: State Mineralogist Reports XII, XXXVIII.

Carbon dioxide produced during 1943 in California came from wells operated by two companies near Niland, Imperial County, and by one company near Hopland, Mendocino County, giving a total of 227,424 M cu. ft. of carbon dioxide gas which was compressed to make 14,037 net tons of dry ice, valued at $248,126; as compared with 193,143 M cu. ft. of gas which made 11,921 tons of dry ice, worth $310,000 in 1942.

Carbon dioxide gas is found many places in nature and is produced commercially from wells and springs whose waters are highly charged with the gas. It is used as a gas in the manufacture of carbonate beverages and dry ice, and in the chemical reduction of carbonates; as dry ice and liquefied as a refrigerant, as a source of power, and in the chemical industry. It has been stated that the amount of butyl rubber is only limited by the amount of dry ice available.

Carbon dioxide gas was first produced commercially in California in 1894. This material came from a drift on the 575 level of the Santa Isabel shaft of the New Almaden Quicksilver mine at Almaden, Santa Clara County. The drift was bulkheaded and a pipe was placed through the bulkhead for the gas to be drawn off, it then being compressed into cylinders and used in the manufacture of soda water.

In 1933 carbon dioxide gas was again produced, this time from wells drilled near Niland, Imperial County. On November 1, 1934, a dry-ice plant was put into operation for condensation of the carbon dioxide produced from the above wells.

Carbon Dioxide Gas Production in California, by Years

Year	M cubic feet	Value
1894	80	$4,072
1895	800	12,000
1896	81	1,300
1897		
1933		
1934 *	15,440	1,822
1935		
1936 *	89,777	64,787
1937		
1938 *	131,189	13,799
1939		
1940	97,660	23,877
1941	138,862	258,563
1942	193,143	310,000
1943	227,424	248,126
Totals	894,456	$938,346

* Annual details concealed under 'Unapportioned.'

CLAY (Pottery)

Bibliography: State Mineralogist Reports I, IV, IX, XII-XV, XVIII-XXVIII (inc.), XXX-XXXIII (inc.), XXXV-XXXVII (inc.). Bulletins 38, 99. Preliminary Report No. 7, U. S. Bureau of Standards, Tech. Paper No. 262.

At one time or another in the history of the State, pottery clay has been mined in thirty-four of its counties. Of these, 18 contributed in 1943. In this report, 'pottery clay' refers to all clays used in the manufacture of red and brown earthenware, china and sanitary ware, flower pots, floor, faience and ornamental tiling, architectural terra cotta, sewer pipe, drain and roof tile, etc., and the figures for amount and value are relative to the crude material at the pit without reference to whether the clay was sold in the crude form or was immediately used in the manufacture of any of the above finished products by the producer. It does not include clay used in making brick and hollow building blocks.

There are many other important uses for clay besides pottery manufacture. Among these may be enumerated paper, cotton goods, and chemicals. Clays of the montmorillonite and halloysite group ('rock soap') are being utilized successfully in the manufacture of soaps and for filtering oils and as oil-well drilling mud, also as an earth filler in irrigating ditches which run through porous ground.

Because of the fact that a given product often requires a mixture of several different clays, and that these are not all found in the same pit, it is necessary for most clay-working plants to buy some part of their raw materials from other localities. For these reasons, in compiling the clay industry figures much care is required to avoid duplications. So far as we have been able to segregate the figures, from the data sent in by the operatives, we have credited the clay output to the counties from which the raw material originated; and have deducted tonnages used in brick manufacture, as bricks are classified separately, herein.

During 1943 forty-one properties operated in 18 counties in California, and reported an output of 622,019 net tons of pottery clay, valued at $1,185,240, f.o.b. shipping point for crude material; as compared with

55 properties in 21 counties producing 622,958 tons, worth $1,200,293 in 1942. The 1943 production distributed by counties was as follows:

A tabulation of the direct returns from the producers, by counties, for the year 1943 is shown herewith:

Pottery Clay in 1943

County	Tons	Value	Used in the manufacture of
Amador	[a]105,815	$236,396	Architectural terra cotta; fire clay and refractories; chimney, drain and sewer pipe; floor, mantel, and roofing tile; art pottery; electrical porcelain; and various.
Kern	[b]96,619	261,243	Oil well drilling mud.
Los Angeles	[b]39,910	53,454	Red earthenware, chimney, drain and sewer pipe; vents; floor, mantel, and roofing tile, art pottery; oil-well drilling mud, and various.
Orange	[a]38,039	160,389	Architectural terra cotta; conduits and segment blocks; electrical, porcelain, and chinaware; refractories; vents; drain, floor, and mantel tile; art pottery; and varius.;
Riverside	120,574	214,918	Conduit sewer, and drain poipe red earthenware; faience, floor, mantel, roofing tile; refractory, and various.
Alameda[a], Calaveras, Contra Costa, Humboldt, Marin, Placer, Sacramento, San Bernardino, San Diego, Santa Clara, Stanislaus, Sutter, Ventura[b*]	221,062	258,840	Drain, roofing, and mantel tile; saggers; electrical porcelain; refractories; red earthenware; garden furniture; oil-well drilling mud; sewer, drain, and conduit pipe; prepared clay, light weight aggregate; and various.
Totals	622,019	$1,185,240	

[a] Includes fire sand.
[b] Includes oil-well drilling mud.
[*] Combined to conceal the output of operators in each.

The above figures do not include clay reported as used in the manufacture of brick and hollow building tile or the bentonite clays, as these are included under separate headings.

POTTERY CLAY PRODUCTS

The output of ceramic products manufactured in California during 1943 had a total value of $13,817,552, as compared with $16,270,372 in 1942. The distribution by products for 1943 is shown in the following tabulation:

Product	No. of Producers	Tons	Value
Architectural terra cotta, chimney pipe and flue lining	6	6,262	$436,933
Drain tile	13	6,924	114,208
Sewer pipe	9	100,551	3,140,350
Roofing tile	10	4,934	94,134
Floor, faience, mantel, and handmade tile	13		1,274,167
Red earthenware	5		182,062
Stoneware and chemical stoneware	5		520,593
Chinaware and semi-vitreous tableware	4		3,906,791
Conduit	4	2,401	58,937
Fire-clay and high temperature cements	5	14,390	521,324
Miscellaneous: electric-stove blocks, vents, art pottery, garden furniture, sanitaryware, plumbing fixtures, electrical porcelain, glass tank backs, grog, dolls, fire tile, clay, shapes, light-weight aggregate, segment blocks, glazed flower-pots, glazed kitchen ware, sundries, specialities, and various	19		3,568,053
Total value			$13,817,552

Of the ceramic products, increases in total value were registered in 1943 by stoneware and chemical stoneware, fire clay and high-temperature cements, and conduit; all others showed a decline in value.

Pottery Clay Production of California, by Years

Amount and value of crude pottery clay output in California since 1887 are given in the following table:

Year	Tons	Value	Year	Tons	Value
1887	75,000	$37,500	1916	134,636	$146,538
1888	75,000	37,500	1917	166,298	154,602
1889	75,000	37,500	1918	112,423	166,788
1890	100,000	50,000	1919	135,708	245,019
1891	100,000	50,000	1920	203,997	440,689
1892	100,000	50,000	1921	225,120	362,172
1893	24,856	67,284	1922	277,232	473,184
1894	28,475	35,073	1923	376,863	697,841
1895	37,660	39,685	1924	417,928	651,857
1896	41,907	62,900	1925	537,587	674,376
1897	24,592	30,290	1926	801,461	806,509
1898	28,947	33,747	1927	867,419	872,661
1899	40,600	42,700	1928	887,807	1,394,950
1900	59,636	60,956	1929	839,949	1,127,527
1901	55,679	39,144	1930	938,586	795,517
1902	67,933	74,163	1931	332,680	408,931
1903	90,972	99,907	1932	167,284	204,890
1904	84,149	81,952	1933	141,629	211,711
1905	133,805	130,146	1934	190,510	245,900
1906	167,267	162,283	1935	240,014	377,969
1907	160,385	254,454	1936	382,823	646,920
1908	208,042	325,147	1937	354,669	705,200
1909	299,424	465,647	1938	304,564	582,608
1910	249,028	324,099	1939	305,517	611,599
1911	224,576	252,759	1940	324,399	687,871
1912	199,605	215,683	1941	551,347	1,217,363
1913	231,179	261,273	1942	622,958	1,200,293
1914	179,948	167,552	1943	622,019	1,185,240
1915	157,866	133,724			
			Totals	14,784,858	$20,929,896

DIATOMITE (Diatomaceous Earth)

Bibliography: State Mineralogist Reports II, XII-XV (inc.), XVII-XXVIII (inc.), XXXI-XXXIII, XXXV-XXXVI. Bulletins 38, 67, 91. Am. Inst. Min. Eng., Bull. 104, Aug. 1915, pp. 1539-1550. U. S. Bur. of Mines, Rep. of Investigations: Serial No. 2341, Jan. 1923. Eng. & Min. Jour.-Press, Vol. 115, pp. 1152-1154, June 30, 1923.

Diatomite, also known as diatomaceous earth, infusorial earth, tripolite and kieselguhr, is very light (when dry a cubic foot weighs 18 to 20 pounds), and extremely porous, chalk-like material composed of pure silica (chalk, being calcareous) which has been laid down under water and consists of the remains of microscopical infusoria and diatoms. The former are animal remains, and the latter are from plants.

The most important deposits in California thus far known are located in Los Angeles, Monterey, Orange, San Luis Obispo, and Santa Barbara counties. The diatomaceous earth of marine origin has proved of superior quality for filtration uses which bring the higher prices. Infusorial or diatomaceous earths are also found in Contra Costa, Fresno, Kern, Plumas, San Benito, San Bernardino, San Joaquin, Shasta, Sonoma, and Tehama counties.

As about 75 percent of the California output is from a single operator, we have concealed the exact figures under the 'Unapportioned' item in the State and county totals. There were three producing properties during 1943, two were in Santa Barbara County, and one in Los Angeles County. The shipments during the year showed an increase in amount and value as compared with 1942.

The material shipped was utilized for insulation of both heat and sound, filtration, paint, pigment, cement admixture, filters, abrasives and for clarification of gasoline and kerosene.

Total Production of Diatomite in California

The first recorded production of these materials in California occurred in 1889; total amount and value of output, to date, are as follows:

Year	Tons	Value	Year	Tons	Value
1889	39	$1,335	1917	24,301	$127,510
1890			1918	35,963	189,459
1891			1919	40,200	217,800
1892			1920	60,764	1,056,675
1893	50	2,000	1921		
1894	51	2,040	1922 *	90,739	1,016,675
1895			1923		
1896			1924 *	193,064	5,729,736
1897	5	200	1925		
1898			1926		
1899			1927 *	275,403	1,995,923
1900			1928		
1901			1929		
1902	422	2,532	1930 *	300,017	4,848,661
1903	2,703	16,015	1931		
1904	6,950	112,282	1932		
1905	3,000	15,000	1933 *	203,228	3,104,154
1906	2,430	14,400	1934		
1907	2,531	28,948	1935		
1908	2,950	32,012	1936 *	290,908	4,243,572
1909	500	3,500	1937		
1910	1,843	17,617	1938		
1911	2,194	19,670	1939 *	266,358	3,941,941
1912	4,129	17,074	1940		
1913	8,645	35,968	1941		
1914	12,840	80,350	1942 *	425,745	6,692,051
1915	12,400	62,000	1943		
1916	15,332	80,649			
			Totals	2,285,694	$33,567,549

* Annual details concealed under 'Unapportioned.'

DOLOMITE

Bibliography: State Mineralogist Reports XV, XVII, XXVII, XXVIII, XXXI, XXXIII-XXXIV.

The 1943 output of dolomite in California totaled 331,251 net tons, valued at $472,756 and came from two properties in Monterey County and one each in Los Angeles, San Benito, and Tuolumne counties. The 1943 production was the largest annual yield on record in this State. The 1942 production amounted to 142,552 tons, worth $413,469.

The material shipped during the year was utilized for magnesium metal, for steel-furnace flux and refractories, stucco dash, terrazzo, kalsomine, poultry grit, artstone, in mineral-wool, for the manufacture of carbon dioxide, and for lime.

Dolomite Production of California, by Years

Previous to the 1915 statistical report of the State Mining Bureau, dolomite was included under limestone, as the two minerals are closely related chemically; but since dolomite, as such, has been found to have certain distinctive applications, we here give it a separate classification.

Amount and value of the output of dolomite, annually, have been as follows:

Year	Tons	Value	Year	Tons	Value
1915	4,192	$14,504	1930		
1916	13,313	46,566	1931 *	66,564	$161,245
1917	27,911	66,416	1932	35,275	40,956
1918	24,560	79,441	1933	54,456	176,575
1919	24,502	67,953	1934		
1920	42,388	132,791	1935 *	108,645	304,984
1921	31,195	99,155	1936	25,807	63,102
1922	52,409	114,911	1937	12,371	24,632
1923	69,519	142,615	1938	4,363	18,339
1924	28,843	71,271	1939	17,791	40,391
1925	42,852	104,900	1940	18,178	52,167
1926	68,640	119,313	1941	22,300	64,595
1927	45,976	79,442	1942	142,552	413,469
1928	38,379	85,342	1943	331,251	472,756
1929	58,644	156,928			
			Totals	1,512,876	$3,214,750

* Annual details concealed under 'Unapportioned.'

FELDSPAR

Bibliography: State Mineralogist Reports XV, XVII-XXVIII (inc.), XXX, XXXI, XXXIV-XXXVII (inc.). Bulletins 67, 91. U. S. Bureau of Mines, Bulletin 92. Eng. & Min. Jour.-Press, Vol. 115, pp. 535-538, Mar. 24, 1923.

During 1943 feldspar was produced and shipped from two properties in California, one each in Fresno and San Bernardino counties, the annual details being concealed under the 'Unapportioned' item to conceal the output of a property. The production showed a decrease in amount and value from the previous year.

The 1941-1942 total output of feldspar was 10,040 net tons worth $56,718.

The requirements of the pottery trade demand that in general the percentage of free silica associated with the feldspar be less than 20 percent, and in some cases the potters specify less than 5 percent. An important factor, also, is the iron-bearing minerals frequently present in pegmatites and granites, such as biotite (black mica), garnet, hornblende and black tourmaline. Feldspar for pottery uses should be practically free of these. The white, potash-mica, muscovite, is not particularly objectionable except that being in thin, flexible plates, it does not readily grind to a fineness required for the feldspar. It is also used in the manufacture of glass, enamel and sanitary ware, in soaps and abrasives, and as a binder for abrasive wheels, etc., all of which have similar specifications to that for pottery.

Total Feldspar Production in California

Total amount and value of feldspar production in California since the inception of the industry are given in the following table, by years:

Year	Tons	Value	Year	Tons	Value
1910	760	$5,720	1928	14,628	$93,745
1911	740	4,560	1929	13,327	78,404
1912	1,382	6,180	1930	5,014	35,654
1913	2,129	7,850	1931	4,795	59,921
1914	3,530	16,565	1932	2,294	15,988
1915	1,800	9,000	1933		
1916	2,630	14,350	1934	*	
1917	11,792	46,411	1935	2,655	30,611
1918	4,132	22,061	1936	3,265	21,855
1919	1,272	12,965	1937	3,430	24,959
1920	4,518	26,189	1938	2,686	10,930
1921	4,349	28,343	1939	1,378	6,970
1922	4,587	37,109	1940	2,076	12,510
1923	11,100	81,800	1941	3,022	16,644
1924	9,055	68,112	1942	*	
1925	8,165	59,615	1943	10,040	56,718
1926	7,300	56,400		*	*
1927	10,932	86,101	Totals	159,773	$1,054,245

* Annual details concealed under 'Unapportioned.'

FLUORSPAR

Bibliography: State Mineralogist Reports XVII, XVIII, XVIV, XXVI. Bulletins 67, 91. Eng. & Min. Jour.-Press, Vol. 177, pp. 489-492, Mar. 22, 1924.

During 1943 there was no commercial production of fluorspar reported in California.

Fluorspar, or calcium fluoride, CaF_2, is one of the most important nonmetallic minerals from an industrial standpoint. About 80 percent of the commercial mineral is prepared in the 'gravel' form and utilized as a flux in the manufacture of steel, for which use no substitute has yet been found.

In California deposits have been reported in Los Angeles, Mono, Riverside and San Bernardino counties. A previous commercial production was made in 1917-1918, when a total of 79 tons valued at $991 was shipped from Riverside County, and in 1933-1934 with 227 tons worth $3,631 coming from San Bernardino County.

Present quotations (Metal and Mineral Markets, Aug. 10, 1944) are: not less than 85 percent CaF_2 and not over 5 percent SiO_2, $33 per ton; No. 2 lump, $33 per ton.

GARNET (Abrasive)

During 1941 the property that shipped abrasive garnets from near Bishop, Inyo County, was shut down. In 1938 and 1939 there were shipments of garnets to the extent of 223 short tons worth $3,375. This was the first commercial production reported in California. The annual figures are concealed under the 'Unapportioned' item so as not to reveal the output of the operator.

Most garnets are utilized on paper and cloth used for woodworking and shoe manufacture and in sand blasting.

Massive deposits of garnet have been noted in several places in California but little has been done to commercialize them owing to the

lack of a market. Recently garnet tailings from some of the tungsten mines have been utilized in airplane factories.

GEMS

Bibliography: State Mineralogist Reports II, XIV, XV, XVII, XVIII, XX, XXI-XXVIII (inc.), XXX-XXXII (inc.), XXXIV-XXXV. Bulletins 37, 67, 91. U. S. G. S., 'Mineral Resources of the U. S.'; Bull. 603, p. 208. Bull. Dept. Geo. Univ. of Cal., Vol. 5, pp. 149-153, 331-380. Am. Jour. Sci., Vol. 31, p. 31.

The production of gem materials in California has been somewhat irregular and uncertain since 1911. The compilation of complete statistics is difficult owing to widely-scattered places at which stones are gathered and marketed, for the most part in a small way. The gem material reported mined and shipped during 1943 in California had a total value of $329,868. This material came from properties in Fresno,

Quartz crystal; 24 inches high; weight 106 pounds; from Green Mountain Mine, Chili Gulch, Calaveras County. *Photo by Walter W. Bradley.*

Calaveras, Imperial, San Bernardino, and Stanislaus counties and consisted of bloodstone, iceland spar, optical quartz and topaz. The 1942 output had a total value of $570 and was reported as jasper, moss agate, californite, and iceland spar. The higher figure for 1943 was due to shipments of optical and piezoelectric grades of quartz.

Varieties of California's Gem Stones

Diamonds have been found in a number of localities in California; but in every case, they have been obtained in stream gravels while working them for gold. The principal districts have been: Volcano in Amador County; Placerville, Smith's Flat and others in El Dorado County; French Corral, Nevada County; Cherokee Flat, Morris Ravine, and Yankee Hill, Butte County; Gopher Hill and upper Spanish Creek, Plumas County. The most productive district of recent years has been Cherokee in Butte County.

California *tourmalines* are decidedly distinctive in coloring and 'fire' as compared to foreign stones of this classification. The colors range from deep ruby to pink, and various shades of green, also blue.

One of our California gem stones, *benitoite*, has not been found elsewhere; and in but a single locality here: The Dallas Mine in San Benito County.

Kunzite, a gem variety of spodumene, was first found in the Pala district in San Diego County. It has thus far been found in only one locality (Madagascar) outside of California. It is of a lilac color, and is described in detail in Bulletin 37 of the State Mining Bureau.

Beryls of excellent fire and delicate colors are also obtained in the pala district, of which the *aquamarine* (blue) and *morganite* (pink) varieties deserve special mention. Morganite, like kunzite, has thus far been found elsewhere only in Madagascar.

Californite, or 'California jade,' is a gem variety of *idorase* (*vesuvianite*), and is green or white in color. It is found in Butte, Fresno, and Siskiyou counties.

Stones of precious blue *topaz* of fine quality are being cut from crystals mined in northern San Diego County. They are associated with beryl and blue tourmaline.

Some *rhodonite* has been mined in Siskiyou County, and used for decorative purposes, its value being included in the marble figures.

Garnets are found in a number of localities in California; the important yield of gems being *hyacinth* and *spessartite* varieties from San Diego County.

Chrysoprase has been produced in Tulare County.

Turquoise has been found in the desert section of San Bernardino County, but none produced commercially in recent years.

Sapphires have been reported found in San Bernardino and Riverside counties, but not as yet confirmed. A few have been found in stream gravels with diamonds in Butte County.

Rubies have been identified by the laboratory of the State Mining Bureau, occurring in limestone from the Baldy Mountains, San Bernardino County. Thus far no stones of commercial size have been taken out.

Total Production of Gem Materials in California

The value of the gem output in California annually since the beginning of commercial production is as follows:

Year	Value	Year	Value
1900	$20,500	1923	$13,220
1901	40,000	1924	4,800
1902	162,100	1925	10,663
1903	110,500	1926	9,049
1904	136,000	1927	7,035
1905	148,500	1928	22,200
1906	497,090	1929	26,850
1907	232,642	1930	3,540
1908	208,950	1931	5,607
1909	193,700	1932	4,961
1910	237,475	1933	690
1911	51,824	1934	2,456
1912	23,050	1935	945
1913	13,740	1936	2,878
1914	3,970	1937	2,075
1915	3,565	1938	4,575
1916	4,752	1939	2,500
1917	3,049	1940	3,176
1918	650	1941	870
1919	5,425	1942	570
1920	36,056	1943	329,868
1921	10,954		
1922	1,312	Total value	$2,604,232

GRAPHITE

Bibliography State Mineralogist Reports XVIII, XIV, XV, XVII, XXVI (inc.), XXX, XXXIII, XXXV. Bulletins 67, 91. U. S. G. S., Min. Res. 1914, Pt. II.

Graphite (also called plumbago) has been produced from time to time in the State, coming principally from Sonoma and Los Angeles counties.

Occurrences of graphite have been reported at various times from Calaveras, Fresno, Imperial, Inyo, Los Angeles, Mendocino, San Bernardino, San Diego, Siskiyou, Sonoma and Tuolumne counties. From 1931 to 1933 there was a small production of graphite from a property in Los Angeles County.

During 1943 no production of graphite was reported in California. In 1935 there was a small output of graphite coming from a single property in Los Angeles County. This material was used for experimental purposes. The annual details are concealed under the 'Unapportioned' item in order not to reveal the output of the single operator.

The principal value of graphite is on account of its infusibility and resistance to the action of molten metals. It is also largely used in the manufacture of electrical appliances, of 'lead' pencils, as a lubricant, as stove polish, paints and in many other ways. Amorphous graphite, commonly carrying many impurities, brings a much lower price. For some purposes, such as foundry facings, etc., the low-grade material is satisfactory. Among the interesting uses for graphite is the prevention of formation of scale in boilers. The action is a mechanical one. Being soft and slippery, the graphite prevents the particles of scale from adhering to one another or to the boiler and they are thus easily removed.

Graphite Production of California, by Years

According to the records of the State Mining Bureau, the graphite production of California, by years, has been as follows:

Year	Pounds	Value	Year	Pounds	Value
1901	128,000	$4,480	1923		
1902	84,000	1,680	1925		
1903			1926	*76,000	$13,120
1913	2,500	25	1927		
1914			1928		
1915			1931		
1916	29,190	2,335	1932	*156,000	1,950
1917			1933		
1918			1934		
1919 *	770,000	37,225	1935	104,000	520
1920			1936		
1921					
1922 *	624,000	26,160	Totals	1,973,690	$87,495

* Annual details concealed under 'Unapportioned,' on account of a single producer.

GYPSUM

Bibliography: State Mineralogist Reports XIV, XV, XVII, XVIII, XXII, XXIII, XXV-XXVIII (inc.), XXX, XXXI, XXX-XXXVI (inc.). Bulletins 38, 67, 91. U. S. Geol. Surv., Bull. 223, 413, 430, 697. U. S. Bur. of Standards, Circular No. 281.

Shipments of gypsum in California during 1943 amounted to a total of 475,967 net tons, worth $916,883, and came from five properties in Kern County and one each in Imperial, Riverside, and Ventura counties; as compared with 425,268 tons, worth $791,892 in 1942. In addition to the above figures a considerable amount of gypsum came from Alameda County, which was obtained in a chemical process for reducing magnesium salts from salt-works bittern water with lime, the amount of which was not included in the above figures as it was used with lime and magnesite. The 1943 figures showed the largest annual output ever reported in this State. Gypsum mined in this State was used in the manufacture of hard-wall and other plasters, in cement, and for agricultural purposes. The increase in recent years in the uses of this material is chiefly in the agricultural field, the tonnage for which now exceeds that for industrial and structural plasters, and that used in cement.

Uses

The most important use of gypsum from the quantity standpoint is in the calcined form where it is utilized in the manufacture of various hard-wall plasters and plaster board. As plaster of paris, it plays a very important part in surgical work. Approximately 2%, by weight, raw gypsum is added in the manufacture of Portland cement just before the final grinding. In this application, the gypsum acts as a retarder to the set of the cement. The use of gypsum tile for non-bearing fireproof partitions, stairway and elevator enclosures, and the protection of steel columns, girders and beams, has increased greatly.

Keene's cement is a gypsum product, calcined to complete dehydration, and an accelerator added such as alum, potassium sulphate, borax, aluminum sulphate.

Land plaster may be applied to the soil by drilling, or scattered in the hill, or it may be sowed broadcast, in quantities ranging from 200 to 500 pounds to the acre.

Total Production of Gypsum in California

Production of gypsum annually in California since such records have been compiled by this Bureau is as follows:

Year	Tons	Value	Year	Tons	Value
1887	2,700	$27,000	1916	33,384	$59,533
1888	2,500	25,000	1917	30,825	56,840
1889	3,000	30,000	1918	19,695	37,176
1890	3,000	30,000	1919	19,813	50,579
1891	2,000	20,000	1920	20,507	92,535
1892	2,000	20,000	1921	37,412	78,875
1893	1,620	14,280	1922	47,084	188,336
1894	2,446	24,584	1923	86,410	289,136
1895	5,158	51,014	1924	25,569	53,210
1896	1,310	12,580	1925	107,613	172,444
1897	2,200	19,250	1926	114,868	211,337
1898	3,100	23,600	1927	94,630	292,090
1899	3,663	14,950	1928	104,790	200,567
1900	2,522	10,088	1929	140,844	396,951
1901	3,875	38,750	1930	116,865	243,507
1902	10,200	53,500	1931	88,354	199,198
1903	6,914	46,441	1932	46,867	93,818
1904	8,350	56,592	1933	59,235	120,451
1905	12,859	54,500	1934	58,149	113,606
1906	21,000	69,000	1935	70,833	151,807
1907	8,900	57,700	1936	143,549	282,703
1908	34,600	155,400	1937	186,160	384,431
1909	30,700	138,176	1938	161,996	327,821
1910	45,294	129,152	1939	219,672	437,343
1911	31,457	101,475	1940	314,843	599,944
1912	37,529	117,388	1941	432,784	854,184
1913	47,100	135,050	1942	425,268	791,892
1914	29,734	78,375	1943	475,967	916,883
1915	20,200	48,953	Totals	4,070,906	$9,299,995

LIMESTONE

Bibliography: State Mineralogist Reports IV, XII-XV (inc.), XVII-XXXI (inc.), XXXIII-XXXV (inc.), XXXVII. Bulletins 38, 91. Oregon Agr. College Extension Bulletin 305. Eng. and Min. Jour.-Press, Vol. 120, pp. 249-253.

'Industrial' limestone was shipped from 19 properties in 11 counties in California during 1943 and totaled 495,262 net tons, valued at 1,378,647, as compared with the 1942 output which came from 22 properties in 12 counties and totaled 474,764 tons worth $1,155,352. Distribution of the 1943 production by counties was as follows:

County	*Net Tons*	*Value*
San Bernardino	50,614	$142,099
Santa Clara	161,003	258,502
Santa Cruz	24,372	156,703
El Dorado, Inyo, Los Angeles, Riverside, San Mateo, Tuolumne, Ventura *	259,273	821,343
Totals	495,262	$1,378,647

* Combined to conceal production of individual operators in each.

Included in the above figures were 172,664 tons of limestone used in the making of 86,332 net tons of lime, valued at $922,800, which came from two properties in San Bernardino County; and one each in Alameda, El Dorado, Santa Cruz, and Tuolumne counties. Also included were

161,752 tons, valued at $429,852, which was used for agricultural purposes and in poultry grit, stock feed, and as a filler in fertilizers. In 1942 there were 197,096 tons of limestone burned to make 98,548 tons of lime worth $961,803.

The amount here does not include the limestone used in the manufacture of cement nor for macadam and concrete, but accounts for that utilized as smelter and foundry flux, for glass and sugar making, other special chemical and manufacturing processes and burned for lime. It also includes that utilized for fertilizers (agricultural 'lime'), 'roofing gravel,' paint and concrete filler, whiting for paint, putty, kalsomine, terrazzo, paving dust, chicken grit, stock feed, carbon dioxide gas, oilwells, mineral wool, 'paving compound,' facing dust for concrete pipe, also for rubber and magnesite mix.

The above limestone for 1943 was produced by four companies in San Bernardino County; three each in Santa Clara and Santa Cruz counties; two each in El Dorado and Tuolumne counties; and one each in Inyo, Los Angeles, Riverside, San Mateo, and Ventura counties. The material from San Mateo County and part from Santa Clara County was shells, dredged from San Francisco Bay, which were ground and used for agricultural purposes, chemical purposes, and for poultry grit.

Limestone Production of California, by Years

The following tabulation gives the amounts and values of 'industrial' limestone produced in California by years since 1894 when compilation of such records was begun by the State Mining Bureau. These tonnages consist principally of limestone utilized for flux, glass and sugar making, agricultural, chemical, and other special industrial purposes. That utilized in cement manufacture is not included: Beginning with 1942 the limestone used in the manufacture of burnt lime was included with these figures, instead of being kept separate as a structural material, as most of the lime is being used in metallurgical and chemical industry, and not in construction as in previous years.

Year	Tons	Value	Year	Tons	Value
1894	15,420	$19,275	1920	90,120	$298,197
1895	71,355	71,690	1921	75,921	305,912
1896	68,184	71,112	1922	84,382	282,181
1897	36,796	38,556	1923	143,266	348,464
1898	27,686	24,548	1924	219,476	582,660
1899	30,769	29,185	1925	319,977	494,525
1900	32,791	31,532	1926	108,795	367,501
1901	76,937	99,445	1927	699,790	663,957
1902	71,422	90,524	1928	127,895	397,935
1903	125,919	163,988	1929	168,315	557,617
1904	40,207	87,207	1930	169,477	508,751
1905	192,749	323,325	1931	177,268	560,699
1906	80,262	162,827	1932	168,950	487,788
1907	230,985	406,041	1933	207,371	487,712
1908	273,890	297,264	1934	198,057	461,139
1909	337,676	419,921	1935	227,214	496,054
1910	684,635	581,208	1936	295,792	661,757
1911	516,398	452,790	1937	351,755	830,562
1912	613,375	570,248	1938	302,665	729,149
1913	301,918	274,455	1939	316,029	838,235
1914	572,272	517,713	1940	563,999	895,832
1915	146,324	156,288	1941	459,153	801,868
1916	187,521	217,733	1942	474,764	1,155,352
1917	237,279	356,396	1943	495,262	1,378,647
1918	208,566	456,258			
1919	88,291	248,145	Totals	11,714,310	$20,759,168

LITHIA

Bibliography: State Mineralogist Reports II, IV, XIV, XXI, XXX, XXXV. Bulletins 38, 67, 91.

During 1943 lithium salts were again produced in California; but coming from a single property, the figures are concealed under the 'Unapportioned' item. Starting with 1938, material came from the brines of Searles Lake in San Bernardino County at the plant of the American Potash and Chemical Corporation, in the form of sodium-lithium phosphate, and was the first output of this kind, previous production being the mineral lepidolite.

Lithia mica, lepidolite (a silicate of lithium and others), utilized in the manufacture of artificial mineral water, fireworks, glass, etc., has been mined in San Diego County since 1899, except between 1905 and 1915, though there was none shipped in 1923, 1925, 1929-1943 (inc.). During 1930 there was a small amount of lepidolite mined in California, but not shipped. Some amblygonite, a lithium phosphate, is occasionally also obtained from pockets associated with the gem tourmalines.

Lithia minerals total production in the State has been as follows:

Year	Tons	Value	Year	Tons	Value
1899	124	$4,600	1923		
1900	440	11,000	1924	109	$2,269
1901	1,100	27,500	1925		
1902	822	31,880	1926		
1903	700	27,300	1927 *	550	13,900
1904	641	25,000	1928		
1905	25	276	1929		
1906			1938		
1915	91	1,365	1939 *	378	100,338
1916	71	1,065	1940		
1917	880	8,800	1941 *	366	84,099
1918	4,111	73,998	1942		
1919	800	14,400	1943 *	478	114,148
1920	10,046	153,502			
1921 * 1922	1,365	20,781	Totals	23,097	$716,221

* Annual details concealed under 'Unapportioned.'

MICA

Bibliography: State Mineralogist Reports II, IV, XXVI-XXVIII (inc.), XXX, XXXIII-XXXVI (inc.). Bulletins 38, 67, 91. U. S. Geol. Surv., Bull. 740; Min. Res. of U. S. Eng. & Min. Jour.-Press, Vol. 115, pp. 55-60, Jan. 13, 1923.

Sericite, a fine-grained variety of Muscovite, has been produced continuously since 1929 in California with the exception of 1934, 1939, 1942, and 1943. The 1941 output came from a single property each in Imperial, Inyo, and Mariposa counties. The annual details are concealed in the 'Unapportioned' items so as not to reveal production of the individual operators. The material mined during the year was sericite. Sericite is used as a cheap grade of ground mica for roofing, as a refractory, foundry facing, and decorative material to imitate snow. A small amount of vermiculite, a hydrous mica, expanded by heating and then used as an insulating agent, was mined in 1936.

Classification and Uses

Practically all marketable mica is of the muscovite or phlogopite varieties. There are three main commercial classes: Sheet mica, including punch; splittings, and scrap. Sheet mica is used chiefly for electrical purposes and for glazing; splittings are made into built-up mica; scrap is ground to a powder. Mica to be classified as sheet must yield a rectangle of at least 1½ x 2 in., must split evenly and freely, be free from cracks, rulings, or plications, and reasonably free from inclusions of foreign matter, though stains of a nonconducting character are permissible for some uses. Ability to withstand heat and high electrical resistance have led to a wide application of sheet mica in the electrical industries. The electrical uses of sheet mica greatly exceed all others in quantity and value of the material used.

As a heat-resisting transparent medium, sheet mica has various uses. It is widely employed for stove windows, though this use has declined to a considerable extent. A hard and rigid mica that is nearly clear is best suited for stove fronts. High-grade stove mica commands a higher price than electrical mica, because for the most part larger sizes are demanded. Mica is also used in furnace and bake-oven sight-holes, heat screens, lamp chimneys, canopies and shades, particularly for gas mantels, and also for military lanterns and in lantern slides.

Its ability to withstand shocks and strains, combined with its transparency, has led to wide use in spectacles, drivers' helmets, smoke helmets, compass cards, gage fronts, and in windows subject to shock, as in the conning towers of warships. On account of its heat-resisting qualities, ground mica is used in railroad car axle packings, foundry facing in pipe and boiler coverings, in fireproof paints, and in rubber tires. Ground mica is used as a component in roofing, as a filler in rubber and other products, in foundry facing, calico printing and as a tire powder. It is used also in tinsel decorations, and as 'Santa Claus snow' for Christmas tree and window decorations. It is used as a lubricant for wooden bearings, and mixed with oil for metal bearings.

The vermiculite variety is any of several hydrous mica minerals which expand upon heating. In recent years they have become valuable as an insulating agent for both heat and sound, when being expanded it often takes on a gold or silver color and is used in window decoration.

Production of mica in California has been as follows:

Year	Tons	Value	Year	Tons	Value
1902	50	$2,500	1937		
1903	50	3,800	1938*	4,969	$31,751
1904	50	3,000	1939		
1929			1940		
1930*	2,240	15,260	1941*	1,469	11,050
1931			1942		
1932					
1933*	1,957	13,963	Totals	14,618	$96,974
1934					
1935					
1936*	3,833	15,650			

* Annual details concealed under 'Unapportioned.'

MINERAL PAINT

Bibliography: State Mineralogist Reports XII-XIX (inc.), XXI, XXII-XXVIII (inc.), XXXV, XXXVII. Bulletins 38, 91.

During 1943 in California shipments of mineral paint were made from a single property in Stanislaus County. The annual details are concealed under the 'Unapportioned' item so as not to reveal the output of the individual producer. The 1941-1942 total output was 145 short tons valued at $1,458. These were the first shipments of mineral paint since 1937, when a small amount came from a single property each in Nevada, Placer, and Yuba counties. The material from Nevada and Yuba counties was a limonite and that from Placer County a sienna.

These materials have come from Alameda, Amador, Butte, Calaveras, Colusa, Los Angeles, Napa, Nevada, Placer, Riverside, Shasta, Sonoma, Stanislaus and Ventura counties. There are also other deposits that may have possible commercial value, but as yet there have been no commercial shipments from El Dorado, Imperial, Kern, Kings, Lake, Mendocino, San Diego, Siskiyou, Trinity, and Yuba counties, in which they are found.

Mineral Paint Production of California, by Years

The first recorded production of mineral paint materials in the State was in the year 1890. The output, showing annual amount and value since that time, is given herewith:

Year	Tons	Value	Year	Tons	Value
1890	40	$480	1916	643	$3,960
1891	22	880	1917	520	2,700
1892	25	750	1918	728	4,738
1893	590	26,795	1919	1,780	17,055
1894	610	14,140	1920	779	8,477
1895	750	8,425	1921	446	4,748
1896	395	5,540	1922	1,620	13,277
1897	578	8,165	1923	1,049	11,773
1898	653	9,698	1924	532	5,234
1899	1,704	20,294	1925	669	6,969
1900	529	3,993	1926	569	5,846
1901	325	875	1927		
1902	589	1,533	1928	*	
1903	2,370	3,720	1929	919	9,592
1904	270	1,985	1930	467	2,820
1905	754	4,025	1931		
1906	250	1,720	1932	*	
1907	250	1,720	1933	250	3,000
1908	335	2,250	1935		
1909	305	2,325	1936	*	
1910	200	2,040	1937	570	5,500
1911	186	1,184	1938	855	5,193
1912	300	1,800	1941		
1913	303	1,780	1942	*	
1914	132	847	1943	145	1,458
1915	311	1,756		*	*
			Totals	21,717	$234,299

* Annual details concealed under 'Unapportioned.'

MINERAL WATER

Bibliography: State Mineralogist Reports VI, XII-XVIII (inc.), XXI-XXIX (inc.), XXXI, XXXIII (inc.), XXXV-XXXVII (inc.), U. S. G. S. Water Supply Paper 338. Min. Res., 1914, 1916. 'Mineral Springs and Health Resorts of California' by Dr. Winslow Anderson, 1890. U. S. Dept. of Agr., Bur. of Chem., Bulletin 91.

A widespread production of mineral water is shown annually in California. These figures refer to mineral water actually bottled for sale, or for local consumption. Water from some of the springs having a special medicinal value brings a price many times higher than the average shown, while in some cases the water is used merely for drinking purposes and sells for a nominal figure. Health and pleasure resorts are located at many of the springs. The waters of some of the hot springs are not suitable for drinking, but are very efficacious for bathing. From a therapeutic standpoint, California is particularly rich in mineral springs.

The commercial output of mineral water in California during 1943 amounted to 22,022,314 gallons valued at $814,700, as compared with 17,559,686 gallons worth $567,897 in 1942. The 1943 output came from springs and wells on 35 properties in 16 counties and was distributed as follows:

County	*Gallons*	*Value*
Lake	8,625	$3,073
Los Angeles	10,640,218	349,173
Napa	33,506	3,569
Sonoma	82,189	13,943
Butte, Contra Costa, Marin, Orange, Placer, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, Shasta, Siskiyou *	11,257,776	444,942
Totals	22,022,314	$814,700

* Combined to conceal the output of producers in each.

The production above tabulated came either from springs or artesian wells and was bottled, in part with artificial carbonation, but mostly natural, and sold for drinking purposes. A large part was used in the preparation of soft drinks with flavors.

Mineral Water Production of California, by Years

Mineral water was bottled for sale, at the Napa Soda Springs, Napa County, as early as 1856,[1] and at other springs in California, notably The Geysers, Sonoma County, also at early dates; but there are no figures available earlier than the year 1887. Amount and values, annually, since that year are shown herewith:

[1] Cronise, T. F., The natural wealth of California, p. 182, 1868.

Year	Gallons	Value	Year	Gallons	Value
1887	618,162	$144,368	1916	2,273,817	$410,112
1888	1,112,202	252,990	1917	1,942,020	340,566
1889	808,625	252,241	1918	1,808,791	375,650
1890	258,722	89,786	1919	2,233,842	340,117
1891	334,553	139,959	1920	2,391,791	421,643
1892	331,875	162,019	1921	3,446,278	367,476
1893	383,179	90,667	1922	4,276,346	486,424
1894	402,275	184,481	1923	5,487,276	616,919
1895	701,397	291,500	1924	8,159,211	818,726
1896	808,843	337,434	1925	12,115,072	1,230,455
1897	1,508,192	345,863	1926	14,074,877	1,171,550
1898	1,429,809	213,817	1927	16,644,423	1,487,183
1899	1,338,537	406,691	1928	25,049,002	1,304,969
1900	2,456,115	268,607	1929	27,032,083	2,040,615
1901	1,555,328	559,057	1930	37,354,111	2,870,663
1902	1,701,142	612,477	1931	26,164,331	1,347,860
1903	2,056,340	558,201	1932	19,031,224	1,495,988
1904	2,430,320	496,946	1933	15,650,406	719,746
1905	2,194,150	538,700	1934	19,882,436	1,071,197
1906	1,585,690	478,186	1935	16,659,254	940,333
1907	2,924,269	544,016	1936	19,348,513	777,899
1908	2,789,715	560,507	1937	18,309,729	1,130,810
1909	2,449,834	465,488	1938	26,900,959	853,998
1910	2,335,259	522,009	1939	16,678,741	735,988
1911	2,637,669	590,654	1940	16,190,549	960,701
1912	2,497,794	529,384	1941	17,746,256	988,520
1913	2,350,792	599,748	1942	17,559,686	567,897
1914	2,443,572	476,169	1943	22,022,314	814,700
1915	2,274,267	467,738	Totals	563,151,965	$37,958,407

PHOSPHATES

Bibliography: State Mineralogist Report XXI. Bulletins 67, 91.

No commercial production of phosphates has been recorded from California, though occasional pockets of the lithium phosphate, amblygonite, Li (AlF) PO_4, have been found associated with the gem tourmaline deposits in San Diego County. Such production has been classified under lithia. In 1938, recovery began on a commercial scale of sodium-lithium phosphate at the plant of the American Potash and Chemical Corporation, at Searles Lake, San Bernardino County. However, the product is sold for its lithium content rather than the phosphate, hence we record it under Lithia.

PUMICE and VOLCANIC ASH

Bibliography: State Mineralogist Reports XII, XIV, XV, XVII, XVIII, XXII-XXV (inc.), XXX-XXXII (inc.), XXXIV-XXXVIII (inc.). Bulletin 38. U. S. Bureau of Mines, I. G. 6560. (See 'Tufa.')

The output of pumice and volcanic ash in California during 1943 amounted to a total of 21,154 net tons valued at $142,665 f.o.b. rail shipping point, compared with 55,603 tons worth $209,539 in 1942.

The 1943 output consisted of 9,962 tons of volcanic ash worth $92,892, which came from two properties each in Kern and Madera counties, and one in San Luis Obispo County; and 11,192 tons of lump pumice worth $49,773 which came from two properties in Inyo County and one each in Mono and Napa counties.

The lump pumice was used for light-weight aggregate in concrete, acoustic plaster, abrasives, scouring bricks, insulating, and hen-house

litter; while the volcanic ash or tuff was employed in making soap, cleanser compounds, as a filler in concrete, in asphalt, and as a carrier for insecticides in dry agricultural sprays. A portion of the Kern County ash is going into the preparation of one of the nationally advertised brands of cleanser compounds.

Pumice Production of California, by Years

Commercial production of pumice in California was first reported to the State Mining Bureau in 1909, then not again until 1912, since which year there has been a small annual output, as indicated by the following table:

Year	Tons	Value	Year	Tons	Value
1909	50	$500	1927	13,779	$168,896
1910			1928	10,440	105,055
1911			1929	10,449	76,123
1912	100	2,500	1930	12,947	128,847
1913	3,590	4,500	1931	11,711	108,130
1914	50	1,000	1932	9,891	86,034
1915	380	6,400	1933	8,243	61,067
1916	1,246	18,092	1934	9,951	54,748
1917	525	5,295	1935	14,890	87,055
1918	2,114	28,669	1936	17,132	143,709
1919	2,388	43,657	1937	10,392	79,005
1920	1,537	25,890	1938	18,783	105,207
1921	406	6,310	1939	41,109	159,951
1922	613	4,248	1940	35,162	126,516
1923	2,936	16,309	1941	85,309	283,663
1924	4,919	33,404	1942	55,603	209,539
1925	5,319	32,937	1943	21,154	142,665
1926	7,170	48,350	Totals	410,288	$2,404,271

PYRITES

Bibliography: State Mineralogist Reports XVIII, XIX, XXII, XXV, XXVI, XXX, XXXV. Bulletins 38, 91. Min. and Sci. Press, Vol. 144, pp. 825, 840.

Pyrite, shipped in California during 1943, came from a single property in Shasta County and showed an increase in value over that of 1942, with a slight decrease in amount. The annual details are placed under 'Unapportioned' to conceal the output of the individual operator.

This material was mostly used in the manufacture of sulphuric acid for explosives and fertilizer. Some iron sulphate had been produced previously and was utilized directly in the preparation of an agricultural fertilizer and insecticide. The sulphur content ranged up to 50.8% S.

This does not include the large quantities of pyrite, chalcopyrite, and other sulphides which are otherwise treated for their valuable metal contents. Some sulphuric acid is annually made as a by-product in the course of roasting certain tonnages of Mother Lode auriferous concentrates while under treatment for their precious metal values.

Pyrites Production in California, by Years

The total recorded pyrites production in California to date is as follows:

Year	Tons	Value	Year	Tons	Value
1898	6,000	$30,000	1922	151,381	$570,425
1899	5,400	28,620	1923	148,004	555,308
1900	3,642	21,133	1924	124,214	517,835
1901	4,578	18,429	1925	129,500	528,550
1902	17,525	60,306	1926	100,896	466,088
1903	24,311	94,000	1927	130,910	564,823
1904	15,043	62,992	1928	90,566	400,627
1905	15,503	63,958	1929	79,169	363,717
1906	46,689	145,895	1930	39,958	194,228
1907	82,270	251,774	1931	25,402	131,174
1908	107,081	610,335	1932		
1909	457,867	1,389,802	1933	* 72,271	297,832
1910	42,621	179,862	1934		
1911	54,225	182,954	1935	* 157,129	547,754
1912	69,872	203,470	1936		
1913	79,000	218,537	1937	* 155,107	541,915
1914	79,267	230,058	1937		
1915	92,462	293,148	1939	* 127,604	452,901
1916	120,525	372,969	1940		
1917	111,325	323,704	1941	* 167,711	598,870
1918	128,329	425,012	1942		
1919	147,024	540,300	1943	* 234,596	1,001,966
1920	146,001	530,581			
1921	110,025	473,735	Totals	3,900,003	$14,485,587

* Annual details concealed under 'Unapportioned.'

SHALE OIL

Bibliography: State Mineralogist Report XIX. U. S. Geol. Surv.; Bulletins 322, 729. U. S. Bur. of Mines, Bull. 210, Eng. and Min. Jour.-Press, Vol. 118, No. 8, pp. 290-292, Aug. 23, 1924. Chem. & Met. Eng., Vol. 32, No. 6, Feb. 1925. Min. Congress Jour., Dec. 1924.

Two plants on a more or less experimental scale operated for six years in California, with commercial production beginning in a small way in 1922. The product, in part, was sold for utilization as a flotation oil in metallurgical work, and part consumed as fuel at the plants. There has been no production reported since 1927.

Shale Oil Production of California, by Years

Year	Barrels	Value
1922		
1923 *	4,333	$44,262
1924		
1925 *	8,688	55,240
1926		
1927 *	8,819	9,998
1928		
Totals	21,840	$109,50

* Annual details concealed under 'Unapportioned.'

SILICA (Sand and Quartz)

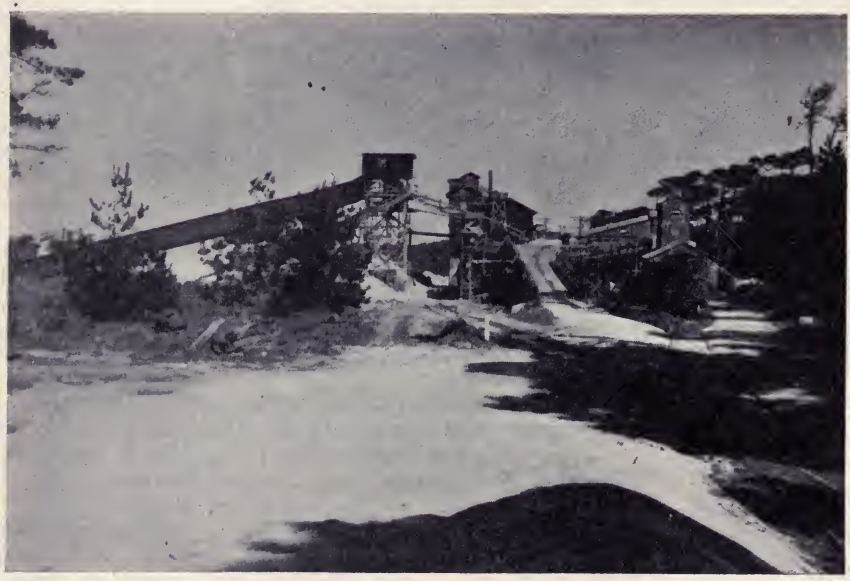
Bibliography: State Mineralogist Reports IX, XIV, XV, XVII, XVIII, XX-XXVIII (inc.), XXXI-XXXII (inc.), XXXV-XXXVIII (inc.). Bulletins 38, 67, 91.

The output of silica (quartz and glass sand) in California during 1943 amounted to 161,318 net tons, valued at $533,434 f.o.b. rail shipping

point, and came from three properties in San Bernardino County; and one each in Contra Costa, Los Angeles, Mariposa, Monterey, Orange, Riverside, and Stanislaus counties. The above figures were a decrease in both amount and value as compared with those of 1942, 193,174 tons, worth $692,762, which was the largest annual recorded output of these materials in this State.

Of the 1943 production, 56,346 tons, worth $149,873, was quartz, and/or ganister and came from properties in Mariposa, Los Angeles, San Bernardino, and Stanislaus counties; the remaining 104,972 tons, worth $383,561, was glass sand and came from Contra Costa, Monterey, Orange, and Riverside counties.

These materials were combined because of an overlapping in their uses and specifications as to the silicon dioxide (SiO_2) content. Vein quartz, ganister, and silica sand are used as refractories, in fire brick, in ceramic mixes and glazes, and as abrasives. It is possible to use quartz as well as glass sand in the manufacture of glass; also some of the quartz was used in the manufacture of ferrosilicon.



Sand Plant of Del Monte Properties Company near Pacific Grove, Monterey County
Photo by Walter W. Bradley

Not included under this heading are such forms of silica as sandstone, flint, tripoli, diatomaceous earth, and the gem forms of 'rock crystal,' amethyst, and opal. Each of these has various industrial uses, which are treated under their own designations.

We combine these materials because of the overlapping roles of vein quartz which is mined for use in glass-making and as an abrasive, and that of silica sand which, although mainly utilized in glass manufacture, also serves as an abrasive. Both varieties are also utilized to some extent in fire-brick manufacture.

We do not include under this heading such forms of silica as quartzite, sandstone, flint, tripoli, diatomaceous earth, nor the gem forms of 'rock crystal,' amethyst, and opal. Each of these has various industrial uses, which are treated under their own designations.

There are various deposits of quartz in California which could be utilized for glass making, but to date they have not been so used owing to the cost of grinding and the difficulty of preventing contamination by iron while grinding.

Silica sand has been produced in the following counties of the State: Alameda, Amador, Contra Costa, El Dorado, Imperial, Inyo, Los Angeles, Mariposa, Mono, Monterey, Orange, Placer, Riverside, San Diego, San Joaquin and Tulare, the chief centers being Contra Costa, Amador, Monterey and Los Angeles counties. The industry is of limited importance, so far, because of the fact that much of the available material is not of a grade which will produce first-class colorless glass; for such, it must be essentially iron-free. Even a fractional percent of iron imparts a green color to the glass.

Total Silica Production in California

Total silica production in California since the inception of the industry, in 1899, is shown below, being mainly sand:

Year	Tons	Value	Year	Tons	Value
1899	3,000	$3,500	1922	9,874	$31,016
1900	2,200	2,200	1923	7,964	30,420
1901	5,000	16,250	1924	6,808	35,006
1902	4,500	12,225	1925	12,498	96,780
1903	7,725	7,525	1926	30,010	104,317
1904	10,004	12,276	1927	24,636	94,762
1905	9,257	8,121	1928	14,814	66,679
1906	9,750	13,375	1929	18,686	79,210
1907	11,065	8,178	1930	17,802	71,380
1908	9,255	22,045	1931	43,330	182,769
1909	12,259	25,517	1932	33,997	136,324
1910	19,224	18,265	1933	70,329	266,520
1911	8,620	8,672	1934	70,432	296,643
1912	13,075	15,404	1935	70,835	297,272
1913	18,618	21,899	1936	77,830	310,278
1914	28,538	22,688	1937	84,313	348,987
1915	28,904	34,322	1938	63,167	278,676
1916	20,880	48,908	1939	86,229	349,074
1917	19,376	41,166	1940	101,041	376,723
1918	23,257	88,930	1941	137,660	514,266
1919	18,659	101,600	1942	193,174	692,762
1920	25,324	96,793	1943	161,318	533,434
1921	10,569	49,179			
			Totals	1,655,796	$5,861,336

SILLIMANITE-ANDALUSITE-KYANITE GROUP

Bibliography: State Mineralogist Reports XX, XXIII, XXIV, XXVII, XXXV-XXXVIII (inc.). Bulletins 67, 91. Dana's Mineralogy. U. S. Geol. Surv., Prof. Paper 110. U. S. Bureau of Mines, Inform. Circ. 6255. Eng. & Min. Jour.-Press. Vol. 120, pp. 91-94, 1925. Amer. Mineralogist, June, 1924.

During 1943 in California shipments of andalusite from Mono County and kyanite from Imperial County were made, the annual details are concealed under 'Unapportioned' item so as not to reveal the output of either operator.

Sillimanite and andalusite are both aluminum silicates (Al_2SiO_5), having the same composition and formula, but with slightly different physical characteristics. Though both crystallize in the orthorhombric system, their crystal habits are different. A massive deposit of andalusite, found in Dry Creek Canyon in the White Mountains of the Inyo Range, in Mono County, is being mined by the Champion Spark Plug Company of Detroit, Michigan. The material is shipped East and utilized in the manufacture of porcelain for automobile spark plugs, for other high-tension electric insulators, laboratory ware and porcelain. Porcelain made from these minerals can be subjected to sudden and extreme changes in temperature without damage.

Kyanite is also an aluminum silicate (Al_2SiO_5), of the same chemical composition as andalusite and sillimanite, but crystallizing in the triclinic system. A deposit of Kyanite is being mined in Imperial County, near Ogilby, by the Vitrefrax Corporation and shipments made to their refractory plant in Los Angeles.

Dumortierite, though differing somewhat in composition from the above, being a basic aluminum silicate ($HAl_8BSi_3O_{20}$), has proved similar in behavior in ceramic work so that it is now being mixed with andalusite for electrical porcelains. A deposit of this mineral in Nevada is being mined for that purpose. Occurrences of massive dumortierite are known in Imperial and San Diego counties in this State and there may yet be some commercial possibilities for them.

Total Sillimanite Group Production of California, by Years

Year	Tons	Value	Year	Tons	Value
1922			1933		
1923			1934		
1924			1935		
1925			1936		
1926			1937		
1927			1938		
1928			1940		
1929			1941		
1930			1942		
1931			1943		
1932					
*	4,584	$98,790	*	3,035	$69,026
*	4,810	203,000	*	3,112	89,214
*	4,276	76,000	*	2,681	70,477
*	4,359	198,893	*	1,344	23,391
*	1,244	21,800	*	4,046	79,355
			Totals	33,491	$929,946

* Annual details concealed under 'Unapportioned.'

SOAPSTONE and TALC

Bibliography: State Mineralogist Reports XII, XIV, XV, XVII-XXVII (inc.), XXX, XXXIII-XXXVII (inc.). Bulletins 38, 67, 91. U. S. Bur. of Mines, Bulletin 213. Rep. of Investigations, Serial No. 2253, May, 1921.

The total production of talc and soapstone in California during 1943 amounted to 63,012 net tons, valued at $723,056; compared with 47,782 tons, worth $545,509, in 1942. The 1943 output was the largest annual production every reported in this State, and was 62,280 tons of high grade talc coming from six properties in Inyo County and four properties in San Bernardino County, and 732 tons of soapstone from a property each in Amador, and El Dorado counties.

The talc was utilized mainly in toilet powder, paint, paper, for rubber manufacture, in ceramics, etc., The 'soapstone' grades were

used mainly for roofing granules and as a filler in roofing paper and part also as an admix in cement.

It is reported that California talc has replaced to some extent imported talc in the toilet trade on the basis of quality. The largest production of talc in the United States comes from New York and Vermont and of massive soapstone from Georgia.

Composition and Varieties

Talc is hydrous magnesium silicate with the chemical formula $H_2Mg_3(SiO_3)_4$. It is also called soapstone and steatite. The term 'talc' properly includes all forms of the pure mineral, whereas 'steatite' denotes particularly the massive, compact variety, and 'soapstone' the impure, massive forms containing as low as 50% of talc. When pure, talc is soft, having a hardness of 1, but impurities increase the hardness up to 3 or 4. The color varies from pure white and silvery white through gray, green, apple green, to dark green, also yellow, brown, and reddish when impure. It is commonly compact or massive, or in fine granular aggregates, and often in foliated plates or in fibrous aggregates.

Uses

Although the uses of talc and soapstone are many and varied, some of them are not in general well known nor fully developed; and although few of their uses can justly be considered essential in the sense that no substitute can be used, there are several which are of great importance. The widest use of talc is in the powdered form, and the value depends upon color (whiteness), uniformity, fineness of grain, freedom from grit, 'slip,' and sometimes freedom from lime. The white varieties, free from grit and iron, low in lime, ground to 200-mesh and finer, are largely used as a filler for paper, rubber and paint, and the very highest grade as toilet powder. Ground talc is also used in dressing and coating cloth, in making soap, rope, twine, pipe-covering compounds, heavy lubricants, and polishes, and as a filler in concrete to make it waterproof. Ground talc and soapstone are used in ceramic body for tile and china; for foundry facings, either alone or mixed with graphite and a coarser grade is used in the manufacture of asphalt-coated roofing felts and papers, both as a filler and as a surfacing. Massive close-grained talc, free from iron and grit, is cut into blanks and baked, forming the material used for gas tips and electrical insulation, commonly known as 'lava.' Its hardness, its resistance to heat, acid and alkalies, and its great dielectric strength make it very useful for electric insulation, and no satisfactory substitute for it has been found.

Massive varieties of talc, pyrophyllite, and high grades of soapstone are cut into slate pencils and steel-workers' crayons. 'French chalk' or 'tailor's chalk' is a soft, massive talc. In China, Japan and India, massive talc (steatite) is carved into images and other forms, and is often sold as imitation jade. Soapstone is cut into slabs of 1 and 2 inches in thickness and sold as griddles, footwarmers, and fireless-cooker stones, or fabricated into laundry sinks and tubs, laboratory table tops, hoods, tanks and sinks, electric switchboards, and for other uses in which the properties of resistance to heat, acids and alkalies, and electricity are essential.

Talc Production of California, by Years

Production was intermittent in the State up to 1912; but there has been a material growth since 1916, as shown in the following table:

Year	Tons	Value	Year	Tons	Value
1893	400	$17,750	1919	8,764	$115,091
1894			1920	11,327	221,362
1895	25	375	1921	8,752	130,078
1896			1922	13,378	197,186
1897			1923	17,439	252,661
1898			1924	16,179	242,770
1899			1925	15,465	239,084
1900			1926	17,004	255,645
1901	10	119	1927	16,218	164,744
1902	14	288	1928	18,668	251,372
1903	219	10,124	1929	18,676	193,493
1904	228	2,315	1930	15,861	154,258
1905	300	3,000	1931	13,472	109,940
1906			1932	10,690	122,880
1907			1933	14,451	153,668
1908	3	48	1934	13,920	158,606
1909	33	280	1935	17,332	170,830
1910	740	7,260	1936	25,643	309,287
1911			1937	29,657	347,772
1912	1,750	7,350	1938	28,346	290,810
1913	1,350	6,150	1939	31,820	372,078
1914	1,000	4,500	1940	37,433	329,425
1915	1,663	14,750	1941	47,935	525,396
1916	1,703	9,831	1942	47,782	545,509
1917	5,267	45,279	1943	63,012	723,056
1918	11,760	85,534			
			Totals	585,689	$6,890,954

STRONTIUM

Bibliography: State Mineralogist Report XXVI, XXVII, XXXV-XXXVI, XXXVIII. Bulletins 67, 91. U. S. G. S. Bull. 540; 660-I.

During 1943 strontium minerals were mined and shipped from one property each in San Bernardino and Imperial counties. The annual details are concealed under the 'Unapportioned' item so as not to reveal the output of the individual. The 1941-1942 output totaled 5,671 short tons valued at $83,069. This material was reported to be used for pyrotechnics (red flares), in the refining of sugar, and in a new alloy of steel.

The first recorded commercial output of strontium minerals in California was in 1916. Shipments reported as averaging 80% $SrCO_3$ have been made, and both celestite ($SrSO_4$) the strontium sulphate and strontianite ($SrCO_3$) the strontium carbonate have been produced commercially in this State. The deposit is associated with deposits of barite near Barstow, San Bernardino County. The carbonate has also been found in massive form near Shoshone, Inyo County. In addition to Imperial County, celestite is found near Calico and Ludlow, and in the Avawatz Mountains in San Bernardino County, but as yet undeveloped.

The principal use for strontium in the United States is in the form of the nitrate in the manufacture of red flares, or Costen and Bengal lights and fireworks.

Production of strontium minerals in California, by years, has been as follows:

Year	Tons	Value	Year	Tons	Value
1916	57	$2,850	1939	2	$82
1917	3,050	37,000	1940	627	8,686
1918	2,900	33,000	1941		
1919			1942 *	5,671	83,069
			1943	*	*
			Totals	12,307	$164,687

* Annual details concealed under 'Unapportioned.'

SULPHUR

Bibliography: State Mineralogist Reports IV, XIII, XIV, XXV, XXXIV, XXXV, XXXVIII. Bulletins 38, 67, 91.

During 1943 there were no shipments of sulphur in California. In 1942 there was one shipper of sulphur from a single property in Inyo County. The annual details are concealed under the 'Unapportioned' item so as not to reveal the output of an individual. The 1942 output was a decrease from that of 1941 which was 9,750 short tons worth $209,269 and was the largest annual production in this State. This mineral has been found to some extent in Alpine, Colusa, Imperial, Inyo, Kern, Lake, Sonoma, Tehama, and Ventura counties.

Total Production of Sulphur in California

Sulphur was produced at the famous Sulphur Bank mine in Lake County, during the years 1865-1868 (inc.); following which the property became more valuable for its quicksilver. The Elgin quicksilver mine, near Wilbur Springs, Colusa County, is a similar occurrence.

Production of sulphur in California to date:

Year	Tons	Value	Year	Tons	Value
1865			1934	4,412	$67,656
1866 *	941	$53,500	1935		
1867			1936	5,308	61,603
1868 to 1922			1937		
1923			1938 *	9,451	120,010
1924 *	185	4,071	1939	4,811	73,741
1925 to 1928			1940	8,803	105,619
1929			1941	9,750	209,296
1930 *	265	9,025	1942	*	*
1931			1943		
1932					
1933 *	1,991	32,838	Totals	45,917	$737,359

* Annual details concealed under 'Unapportioned.'

ZIRCON

Bibliography: State Mineralogist Report XXXIV.

During 1943 there was no production of zircon reported in California but in 1941 there was a small shipment of zircon sand from near Lincoln, Placer County, to the East Coast to be used in a steel alloy. In 1937 for the first time, zircon was reported in commercial quantities, in this State, from the Kaufield dragline dredge near Lincoln. They recovered considerable zircon from their black sand but only shipped a small amount for experimental purposes in the manufacture of refractories and as an abrasive in blast sand.

The chief source of zirconium is the mineral zircon, a zirconium silicate, $ZrSiO_4$. Zircon is used, as a gem, being next to the diamond in brilliancy; as a refractory, molds for steel, insulation in electric heating devices, as a coating on other refractories, coating of welding rods, and in the manufacture of other zirconium compounds.

The metal zirconium is used in radio tubes as an alloy in steel, with copper, etc.

CHAPTER SIX

SALINES

Bibliography: State Mineralogist Reports III, XIV, XV, XVII-XXIX (inc.), XXXIII-XXXVIII (inc.). Bulletin 24. Spurr and Wormser, "Marketing of Minerals." "Non-Metallic Minerals," by R. B. Ladoo. "Industrial Minerals and Rocks," A. I. M. E., 1937. See also under each substance.

Under this heading are included borax, common salt, soda, potash, and other alkaline salts. The first two have been produced in a number of localities in California, more or less regularly since the early sixties. Except for a single year's absence, soda has had a continuous production since 1894. Potash, magnesium chloride and sulphate, and calcium chloride have been added to the commercial list in recent years, joined in 1926 by bromide, and in 1931 by iodine and in 1938 by the alum minerals.

Our main resources of salines are the lake beds of the desert regions of Imperial, Inyo, Kern, Los Angeles, San Bernardino, and San Luis Obispo counties, and the waters of the Pacific Ocean.

The saline group showed an increase in total value from $15,645,003 in 1942 to $15,660,400 in 1943, with all substances included under this heading showing an increased output with the exception of salt.

The following table gives details for each year:

Substance	1942		1943		Increase+ Decrease— Value
	Amount	Value	Amount	Value	
Borates	203,716 tons	$4,929,553	216,687 tons	$4,953,174	$23,621+
Magnesium salts	6,206 tons	642,680	9,026 tons	728,065	85,385+
Salt	672,324 tons	1,922,991	631,776 tons	1,695,231	227,760—
Soda (soda ash and salt cake)	267,723 tons	3,125,078	260,590 tons	3,166,576	41,498+
Unapportioned*		5,024,701		511,735	92,653+
Total value		$15,645,003		$15,660,400	
Net increase					$15,397

* Includes bromine, calcium chloride, iodine, and potash.

ALUM MINERALS

Bibliography: State Mineralogist Reports XXXV, XXXVII.

There are several minerals found in California that are considered natural alums. They are hydrous aluminum sulphates combined with sulphates of iron, potassium, sodium or magnesium. The most important are: Alunite, $K_2Al_6(OH)_{12}(SO_4)_4$, a basic hydrous aluminum and potassium sulphate, and Alunogen, $Al_2(SO_4)_3.16H_2O$, an hydrous aluminum sulphate.

In 1938 a small production and some development work was done on an alunogen deposit near Corona, Riverside County. This output was the first recorded commercial production reported in California. The annual details are combined under 'Unapportioned' item to conceal the output of the single operator. An alunite deposit near Glen Ellen, Sonoma County, was opened up several years ago and some development work has been done in hopes of commercializing this mineral.

BORATES

Bibliography: State Mineralogist Reports III, X, XII-XV (inc.), XVII-XXIII (inc.), XXV-XXVII (inc.), XXXIII-XXXIV, XXXVI, XXXVII. Bulletins 24, 67, 91.

During the year, there was produced in California a total of 249,523 net tons of borate material, as compared with 232,833 tons for the preceding year. The material shipped during the year included the sodium borates, kernite (rasorite), kramerite from Kern County; also crystallized borax prepared by evaporation of brines at Searles Lake in San Bernardino County and Owens Lake in Inyo County, and a small amount of colemanite from Death Valley, Inyo County.

As the crude ore is not sold as such but is almost entirely refined into borax of commerce before shipping, and because of the fact that the material varied widely in boric acid content, we have recalculated the tonnage to a basis of 40 per cent A.B.A. This is approximately the average A.B.A. content of colemanite material after calcining, and also of the crystallized borax obtained from evaporation of the lake brines.

Recalculated, the 1943 output totaled 216,687 net tons, valued at $4,953,174, as compared with 203,716 tons worth $4,929,553 for the year 1942. The above came from two properties each in Inyo and San Bernardino counties, and one in Kern County.

Total Production of Borate Materials in California

Borax was first discovered in California in the waters of Tuscan Springs in Tehama County, January 8, 1856. Borax Lake in Lake County was discovered in September of the same year by Dr. John A. Veach. This deposit was worked in 1864-1868, inclusive, and during that time produced 1,181,365 pounds of refined borax. The bulk of it was exported by sea to New York. This was the first commercial output of this salt in the United States, and California is still today the leading American producer of borax, having been for many years the sole producer. California is also the premier world source, today.

Production from the dry lake 'playa' deposits of Inyo and San Bernardino counties began in 1873; but it was not until 1887 that the borax industry was revoluntionized by the discovery of the colemanite beds at Calico, in San Bernardino County and later similar beds in Inyo and Los Angeles counties. The colemanite deposits of Ventura County were not worked extensively, owing to lack of transportation facilities. Some production of colemanite has been made from deposits opened up in Clarke County, Nevada. Colemanite was in turn, displaced by the discovery in 1926 of kernite (rasorite) a sodium borate and probertite (kramerite) a hydrous sodium, and calcium borate, near Kramer in Kern County. The brines of Searles Lake are likewise an important source.

The total production of borate materials in California is shown in the following table:

Total Production of Borate Materials in California

Year	Tons	Value	Year	Tons	Value
1864	12	$9,478	1904	45,647	$698,810
1865	126	94,099	1905	46,334	1,019,158
1866	201	132,538	1906	58,173	1,182,410
1867	220	156,137	1907	53,413	1,200,913
1868	32	22,384	1908	22,200	1,117,000
1869			1909	16,628	1,163,960
1870			1910	16,828	1,177,960
1871			1911	50,945	1,456,672
1872	140	89,600	1912	42,135	1,122,713
1873	515	255,440	1913	58,051	1,491,530
1874	915	259,427	1914	62,500	1,483,500
1875	1,168	289,080	1915	67,004	1,663,521
1876	1,437	312,537	1916	103,523	2,409,375
1877	993	193,705	1917	109,944	2,561,958
1878	373	66,257	1918	88,772	1,867,908
1879	364	65,443	1919	66,791	1,717,192
1880	609	149,245	1920	127,065	2,794,206
1881	690	189,750	1921	50,136	1,096,326
1882	732	201,300	1922	[2]39,087	1,068,025
1883	900	265,500	1923	62,667	1,893,798
1884	1,019	198,705	1924	52,070	1,599,149
1885	942	155,430	1925	46,124	1,526,938
1886	1,285	173,475	1926	47,605	1,625,298
1887	1,015	116,689	1927	72,462	3,043,260
1888	1,405	196,636	1928	109,722	3,378,552
1889	965	145,473	1929	144,678	3,312,085
1890	3,201	480,152	1930	209,869	3,686,817
1891	4,267	640,000	1931	206,405	5,753,037
1892	5,525	838,787	1932	179,356	2,856,470
1893	3,955	593,292	1933	197,495	3,019,513
1894	5,770	807,807	1934	240,696	5,524,262
1895	5,959	595,900	1935	280,249	4,602,064
1896	6,754	675,400	1936	313,389	5,911,093
1897	8,000	1,080,000	1937	326,099	6,206,619
1898	8,300	1,153,000	1938	276,144	5,014,237
1899	20,357	1,139,882	1939	244,819	5,110,807
1900	25,837	1,013,251	1940	212,358	5,254,154
1901	22,221	982,380	1941	224,986	4,745,872
1902	[1]17,202	2,234,994	1942	203,716	4,929,553
1903	34,430	661,400	1943	216,687	4,953,174
			Totals	5,180,608	$128,874,462

[1] Refined borax.
[2] Recalculated to 40% 'anhydrous boric acid' equivalent beginning with 1922.

BROMINE

Bibliography: State Mineralogist Report XXXVII.

The first commercial production of bromine and bromine compounds was begun during 1926 by the California Chemical Corporation in its plant at Chula Vista, San Diego County, from salt-works bittern waters. This same plant has been recovering magnesium chloride for a number of years. Bromine is also now being made at a similar bittern-water plant at Newark, Alameda County, and beginning in 1940 from brines at Searles Lake, San Bernadino County. The 1943 output is an increase in amount and value as compared with that of 1942. The 1943 yield was the largest annual production on record in California; annual details of which are concealed under the 'Unapportioned' item so as not to reveal the production of the single company which operated both plants.

The total commercial production of bromine in California is as follows:

Year	Tons	Value	Year	Tons	Value
1926			1935		
1927			1936		
1928			1937		
1929			1938		
1930			1939		
1931			1940		
1932			1941		
1933			1942		
1934			1943		
			Totals	7,023	$2,609,283

* Annual details concealed under 'Unapportioned.'

CALCIUM CHLORIDE

Bibliography: State Mineralogist Report XXXVII U. S. Geol. Surv. Min. Res. 1919, Pt. II. Engineering and Contracting, Roads and Streets, monthly issue, Feb. 6, 1924. 'How to Maintain Roads,' manual of instruction of Dow Chemical Company.

Calcium chloride is hygroscopic, that is, it has an affinity for water. This property is taken advantage of by utilizing this salt as a drying agent.

During 1943 the production of calcium chloride in California came from one property in San Bernardino County. The annual details are combined under the 'Unapportioned' item to conceal the output of the operator. The 1943 output showed an increase in both amount and value as compared with that of 1942.

Total Calcium Chloride Production in California

Commercial production of calcium chloride in California was first reported to the State Mining Bureau in 1921, from two plants in San Bernardino County, being obtained as a by-product in the refining of salt from deposits in certain of the desert dry lakes. Total production in California is shown in the following tabulation:

Year	Tons	Value	Year	Tons	Value
1921	683	$22,980	1934		
1922			1935		
1923	1,204	26,580	1936		
1924			1937		
1925	10,988	328,876	1938		
1926			1939		
1927	34,195	508,748	1940		
1928			1941		
1929	12,020	114,080	1942		
1930			1943		
1931	9,688	103,237			
1932			Totals	112,017	$1,301,353
1933	3,103	15,500			

* Annual details concealed under 'Unapportioned.'

IODINE

Bibliography: State Mineralogist Reports XXXIV, XXXVI-XXXVII. U. S. Bureau of Mines I. C. 6387.

In 1943 the output of iodine in California came from two plants in Los Angeles County and showed an increase in value as compared with that of 1942. The annual details for 1943 are combined under the 'Unapportioned' item to conceal the output of either operator. The 1943 production was the largest in amount and value so far reported in this State. The combined 1941-1942 output totaled 979,733 pounds valued at $1,207,613.

Total Iodine Production in California

Iodine was first produced in California during 1917 to 1921 as a by-product of potash which was reduced from kelp in an experimental station of U. S. Department of Agriculture at Summerland, but after the armistice the demand for these minerals decreased so that the plant in Santa Barbara County closed. In 1929 the General Salt Company erected a plant which reduces iodine from the waste waters of certain deep oil wells in the Long Beach field. During 1933 two more plants started operation, making a total of three producing plants in the State.

Year	Pounds	Value
1929		
1931*	696,297	$1,374,311
1933		
1934	355,279	423,016
1935		
1936*	487,401	379,702
1937		
1938*	624,318	508,119
1939		
1940*	795,510	862,931
1941		
1942*	979,733	1,207,613
1943	*	*
Totals	3,938,538	$4,728,538

* Annual details concealed under 'Unapportioned.'

MAGNESIUM SALTS

Bibliography: State Mineralogist Reports XX, XXI, XXV-XXVI (inc.), XXXIV, XXXVII. Bulletin 91. 'Dictionary of Applied Chemistry,' by Thorpe. U. S. Geol. Surv., Min. Res. of P. S.

Magnesium salts were produced in California during 1943 by two companies in San Mateo County, and one each in Alameda and San Diego counties, with a total of 9,026 net tons, valued at $728,065; compared with 6,260 tons, worth $642,680 in 1942. The material from Alameda County was basic magnesium carbonate and magnesium hydroxide; that from San Diego County was magnesium chloride; and that from San Mateo County was basic magnesium carbonate, magnesium carbonate, magnesium hydroxide, and magnesium oxide. Also coming from Alameda County was a tonnage of magnesium hydroxide but not included in the above totals as this material was used as magnesite and therefore will be included under that substance. The 1943 output was the largest

annual production in both amount and value thus far reported in this State. The chloride was nearly all sold for use in magnesite stucco and cement mixtures (Sorel cement), also some for road liquor. The carbonate, or bulky white powder, was used as a heat-insulating material, as a substitute for magnesite, as a filler for rubber, paper, paint, etc., and in medicines, in tooth paste, in face powder and as a polish for metal and glass. The sulphate market as in past years was utilized for medicinal and bath purposes. The material coming from San Diego County was residual bitterns from the salt plants and was in part marketed in the liquid form carrying from 35% to 67% $MgCl_2$ and in part as dry crystals, while that from Alameda and San Mateo counties was magnesium carbonate, magnesium hydroxide, and magnesium oxide, obtained by precipitation from sea water.

The average value reported for the chloride produced in California in 1943 was approximately $37.00 per ton f.o.b. plant, as compared with $38.38 in 1942.

Total Production of Magnesium Salts in California

Commercial production of magnesium chloride in California was begun in 1916 by some of the salt companies, from the residual bitterns obtained during the evaporation of sea water for its sodium chloride. In addition, some magnesium sulphate, or 'epsom salts' has also been made, but in smaller amount, and magnesium carbonate by a patented process, direct from sea water.

The total production of magnesium salts in California, since the beginning of the industry here, is shown in the following tabulation:

Year	Tons	Value	Year	Tons	Value
1916	851	$6,407	1931		
1917	1,064	34,973	1932*	2,749	$217,979
1918	1,008	29,955	1933	2,073	159,660
1919	1,616	82,457	1934	2,325	194,642
1920	3,150	107,787	1935	2,785	235,531
1921	4,153	106,140	1936	3,798	347,838
1922	3,036	89,788	1937	3,867	316,669
1923	3,662	116,031	1938	24,176	469,636
1924	4,823	145,883	1939	3,895	382,457
1925	4,221	132,553	1940	4,325	419,666
1926	4,881	124,470	1941	6,352	654,372
1927			1942	6,260	642,680
1928*	6,241	139,589	1943	9,026	728,065
1929					
1930*	4,914	333,906	Totals	115,251	$6,219,134

* Annual details concealed under 'Unapportioned.'

POTASH

Bibliography: State Mineralogist Reports XV, XVIII, XX, XXII, XXV-XXXVII (inc.), XXXIV, XXXVII. Bulletins 24, 67, 91. U. S. G. S., Min. Res. 1913, 1914, 1915. Senate Doc. No. 190, 62 Congress, 2d Session. Mining & Sci. Press, Vol. 112, p. 155; Vol. 114, p. 789. Eng. & Min. Jour.-Press, Vol. 117, p. 557, Apr. 5, 1924.

The 1943 production of potash in California came from a single operator in San Bernardino County, the details of which are concealed under the 'Unapportioned' item. This was principally chloride and the

product averaged 60% equivalent K_2O content. The material was sold mainly for fertilizer manufacture.

Total Production of Potash in California

Potash production began commercially in California in 1914, with a small yield from kelp. Practically all of the output now comes from deposits of potash-bearing residues and brines in the old lake beds of the desert regions, particularly Searles Lake, San Bernardino County. A small amount has been made from salt-works bitterns, and for a time there was some from Portland cement dust. Some also has been obtained from molasses distillery-slops char.

The annual amounts and values of these potash materials, since their beginning in California in 1914, have been as follows:

Year	Tons	Value	Year	Tons	Value
1914	10	$460	1930		
1915	1,076	19,391	1931*	172,263	$5,500,536
1916	17,808	663,605	1932		
1917	129,022	4,202,889	1933*	153,147	3,932,721
1918	49,381	6,808,976	1934		
1919	28,118	2,415,963	1935*	355,604	3,750,809
1920	26,298	1,465,463	1936		
1921	14,806	390,210	1937*	358,417	6,988,922
1922	17,776	584,388	1938		
1923	29,597	709,836	1939*	383,981	9,057,866
1924	33,107	747,407	1940		
1925	36,355	829,770	1941*	310,023	6,058,274
1926	32,884	812,285	1942		
1927	67,340	1,952,852	1943*	375,542	7,647,355
1928					
1929*	178,680	5,522,350	Totals	2,671,335	$69,067,308

* Annual details concealed under 'Unapportioned.'

SALT

Bibliography: State Mineralogist Reports II, XII-XV (inc.), XVII-XXIII (inc.), XXV-XXVII (inc.), XXXIV-XXXVIII (inc.). Bulletins 24, 67, 91. U. S. Geol. Survey, Bull. 669. U. S. Bur. of Mines, Bull. 146.

Most of the salt production in California is obtained by evaporation of water of the Pacific Ocean, plants being located on the shores of San Francisco, Monterey, and San Diego bays, and at Long Beach. Additional amounts are derived from lakes and lake beds in the desert regions (in part, rock salt), mainly in Imperial, Kern, and San Bernardino counties, and evaporation of alkaline lake water in Modoc County. A small amount of valuable medicinal salts has been obtained by evaporation of the water of Lake Mono, Mono County, and from a mineral spring in Butte County.

The 1943 salt production in California totaled 631,776 net tons, valued at $1,695,231, and came from three properties in Alameda County; two in San Bernardino County; and one each in Kern, Los Angeles, Monterey, and San Diego counties. The figures for 1942 were 672,324 tons worth $1,922,991. In 1943 two properties each in Imperial and San Bernardino counties; and one property each in Modoc, and Orange counties, which made a production in 1942, were closed down owing to floods or man power shortage.

The average value reported by salt producers in California in 1943 was $2.68 per net ton, f.o.b. plant compared with $2.90 in 1942; $2.72 in 1941; $2.79 in 1940; $2.75 in 1939; $2.78 in 1938; $2.82 in 1937; and $3.08 in 1936.

Production of Salt in California, by Years

Although salt has been made in California since the early '60's, there are no definite or authenticated records for the earlier years before the beginning of the statistical tabulations by the State Mining Bureau.

Amount and value of annual production of salt in California from 1887 is shown in the following tabulation:

Year	Tons	Value	Year	Tons	Value
1887	28,000	$112,000	1916	186,148	$455,695
1888	30,800	92,400	1917	227,825	584,373
1889	21,000	63,000	1918	212,076	806,328
1890	8,729	57,085	1919	233,994	896,963
1891	20,094	90,303	1920	230,638	972,648
1892	23,570	104,788	1921	197,989	832,702
1893	50,500	213,000	1922	223,238	819,187
1894	49,131	140,087	1923	275,979	1,130,670
1895	53,031	150,576	1924	318,800	1,159,137
1896	64,743	153,244	1925	284,068	949,826
1897	67,851	157,520	1926	311,761	1,124,978
1898	93,421	170,855	1927	263,028	639,127
1899	82,654	149,588	1928	340,580	1,024,656
1900	89,338	204,754	1929	392,039	2,665,436
1901	126,218	366,376	1930	347,945	1,167,487
1902	115,208	205,876	1931	330,951	1,233,567
1903	102,895	211,365	1932	256,353	918,480
1904	95,968	187,300	1933	321,312	1,251,024
1905	77,118	141,925	1934	332,194	1,222,810
1906	101,650	213,228	1935	365,711	1,230,480
1907	88,063	310,967	1936	398,249	1,227,505
1908	121,764	281,469	1937	370,431	1,044,325
1909	155,680	414,708	1938	395,746	1,099,737
1910	174,920	395,417	1939	417,956	1,174,386
1911	173,332	324,255	1940	462,282	1,290,728
1912	185,721	383,370	1941	434,237	1,180,929
1913	204,407	462,681	1942	672,324	1,922,991
1914	223,806	583,553	1943	631,776	1,695,231
1915	169,028	368,737	Totals	12,233,270	$38,431,833

SODA

Bibliography: State Mineralogist Reports XII, XIII, XV, XVII, XVIII, XX, XXII, XXIII, XXV-XXIX (inc.), XXXIV, XXXVI-XXXVIII. Bulletins 24, 67, 91. U. S. Geol. Surv., Bull. 717.

The production of sodium salts in California in 1943 included soda ash, and trona, from plants at Owens Lake, Inyo County; and soda ash, salt cake, and trona (sequi-carbonate, a double salt of Na_2CO_3 and $NaHCO_3$) from Searles Lake, San Bernardino County. The plant on Dale Lake near Amboy and Searles Lake, San Bernardino County, started operations during the year 1940 and made shipments of salt cake in 1941. There were no shipments of salt cake (sulphate) from Carrizo Plains, San Luis Obispo County. Shipments made during the year 1943 totaled 260,590 net tons valued at $3,166,576, as compared with 267,723 tons worth $3,125,078 in 1942. The 1943 output had the largest value of any annual production ever reported in this State,

although the tonnage was less than that of 1942 owing to an increase in the amount of soda ash and a decrease in the amount of salt-cake. In 1943 there was 165,696 tons of soda ash and 94,894 tons of salt-cake reported shipped in California.

The soda ash was used mainly in the manufacture of soap, glass, paper, oil refining, sugar refining, and chemicals; and the trona for metallurgical purposes. The salt cake or sodium sulphate was used in the manufacture of paper, glass, and in chemicals.

Soda Production of California, by Years

The total output, showing amount and value of these materials in California since the inception of the statistical records of the State Mining Bureau, is given in the table which follows:

Year	Tons	Value	Year	Tons	Value
1894	1,530	$20,000	1919	21,294	$721,958
1895	1,900	47,500	1920	32,407	1,164,898
1896	3,000	65,000	1921	14,828	438,996
1897	5,000	110,000	1922	20,084	573,661
1898	7,000	154,000	1923	34,885	764,284
1899	10,000	250,000	1924	32,536	711,796
1900	1,000	50,000	1925	48,625	947,649
1901	8,000	400,000	1926	63,333	1,305,802
1902	7,000	50,000	1927	62,571	1,478,239
1903	18,000	27,000	1928	80,838	1,469,297
1904	12,000	18,000	1929	90,646	1,838,657
1905	15,000	22,500	1930	90,122	1,627,344
1906	12,000	18,000	1931	78,701	1,217,811
1907			1932	58,017	826,369
1908	9,600	14,400	1933	70,598	1,019,130
1909	7,712	11,593	1934	99,380	1,219,561
1910	8,125	11,862	1935	125,504	1,341,045
1911	9,023	52,887	1936	144,314	1,412,788
1912	7,200	37,094	1937	153,685	1,461,057
1913	1,861	24,936	1938	178,105	2,023,610
1914	6,522	115,396	1939	200,049	2,055,608
1915	5,799	83,485	1940	228,108	2,339,639
1916	10,593	264,825	1941	179,210	2,028,718
1917	24,505	928,578	1942	267,723	3,125,078
1918	20,447	855,423	1943	260,590	3,166,576
			Totals	2,948,970	$39,912,050

CHAPTER SEVEN

BY COUNTIES

Introductory

The State of California includes a total area of 158,297 square miles, of which 156,803 square miles are of land (according to 1940 census resurvey). The maximum width is 235 miles, the minimum 148 miles, and the length from the northwest corner to the southeast corner is 775 miles. The State is divided into fifty-eight counties. The 1940 census figures show a total population for California of 6,907,387. Minerals of commercial value exist in every county, and during 1940 some active production was reported to the State Division of Mines from all of the fifty-eight.

Rank of Counties in Mineral Yield, 1943

Of the ten leading counties in point of total value of mineral output during 1943, the first five Los Angeles, Kern, Fresno, Orange, Ventura; and Santa Barbara seventh; and Kings eighth owe their position to petroleum and natural gas. Los Angeles County due to crude oil led all other counties in 1943 and is credited with 24% of the State's mineral value, holding this position since 1923 when it passed Kern County, which led for many years. San Bernardino County sixth owes its position to cement, borates, iron, potash, and soda; Santa Clara ninth to cement; Inyo tenth to tungsten.

There were twenty-nine counties having a mineral production valued in excess of a million dollars in 1943. The value of cement and natural gas exceeded the million dollar mark in eight counties each; petroleum in seven counties; miscellaneous stone in six counties; borates and brick in two counties each; copper, gold, diatomite, iron ore, potash, quicksilver, salt, soda, and tungsten ore in one each.

In point of variety and diversity San Bernardino County led all others in 1943 with thirty different mineral substances on its commercial list; followed in turn by Kern and Los Angeles counties each with eighteen; Inyo County with fifteen; Orange County with thirteen; Calaveras, Fresno, Riverside, Shasta, and Stanislaus counties each with twelve; Nevada and San Diego counties each with eleven; and Amador, El Dorado, Napa, and Santa Barbara counties each with ten.

Mineral output by counties in order of value for 1943:

County	Value	County	Value
1. Los Angeles	$100,688,245	31. Glenn	915,030
2. Kern	94,245,359	32. Nevada	890,647
3. Fresno	41,039,427	33. Lake	798,381
4. Orange	28,068,896	34. Tuolumne	783,508
5. Ventura	25,080,976	35. Butte	755,968
6. San Bernardino	22,042,939	36. Imperial	685,203
7. Santa Barbara	16,830,725	37. Del Norte	609,664
8. Kings	16,015,695	38. Amador	534,098
9. Santa Clara	8,128,250	39. Mariposa	443,693
10. Inyo	8,025,406	40. San Francisco	432,500
11. Sacramento	6,588,998	41. Yolo	365,476
12. Riverside	5,452,740	42. Trinity	323,123
13. Alameda	5,336,917	43. El Dorado	304,449
14. Solano	4,931,944	44. Tulare	301,292
15. Contra Costa	4,284,821	45. Marin	280,119
16. Shasta	3,766,717	46. Placer	277,283
17. San Benito	3,528,462	47. Humboldt	237,827
18. San Mateo	3,041,434	48. Plumas	207,509
19. Santa Cruz	2,900,752	49. Sierra	176,016
20. Calaveras	2,831,543	50. Colusa	93,486
21. Siskiyou	1,896,246	51. Mendocino	82,480
22. Yuba	1,734,670	52. Sutter	74,905
23. San Diego	1,650,586	53. Tehama	72,917
24. San Joaquin	1,621,661	54. Mono	56,205
25. Sonoma	1,521,314	55. Madera	55,575
26. Monterey	1,142,800	56. Modoc	28,691
27. Merced	1,118,313	57. Lassen	25,353
28. Stanislaus	1,112,486	58. Alpine	20,241
29. San Luis Obispo	1,037,062		
30. Napa	948,557	Total	$426,445,280

ALAMEDA

Land area: 732 square miles.
Population: 513,011 (1940 census).
Location: East side of San Francisco Bay.
County seat: Oakland.
References: State Mineralogist Report XVII:XVIII:XX:XXVI (Oct., 1929); XXXV.

Alameda, while in no sense one of the 'mining counties,' came thirteenth on the list of counties as to value, with a mineral production for 1943 worth $5,336,917 and had nine different substances. This was a decrease over the 1942 output which was valued at $6,112,794.

Commercial production for 1943 was as follows:

Substance	Value
Miscellaneous stone	$3,359,657
Unapportioned *	1,977,260
Total value	$5,336,917

* Includes brick, bromine, clay (pottery), gypsum (manufactured from sea water), magnesite, magnesium salts, manganese ore, salt.

ALPINE

Land area: 776 square miles.
Population: 323 (1940 census).
Location: On eastern border of State, south of Lake Tahoe.
County seat: Markleeville.
References: State Mineralogist Report XV:XVII:XVIII:XXVII (Oct., 1931):XXV:XXXVII.

Alpine County ranked fifty-eighth in value of output for 1943 which was $20,241, compared with $3,097 in 1942. The 1943 production was miscellaneous stone and tungsten ore.

AMADOR

Land area: 601 square miles.
Population: 8,973 (1940 census).
Location: East-central part of State—Mother Lode District.
County seat: Jackson.
References: State Mineralogist Report XV:XVII:XVIII:XIX:XX:XXII (April, 1927):XXX:XXXV:XXXVII.

Amador County ranked thirty-eighth as to value of mineral output for 1943 with ten different substances worth $534,098, compared with $2,092,030 in 1942.

Amador at one time led the State in gold production, though exceeded in 1920-1923 and in 1926-1927 by Yuba and Nevada counties; but in 1925 and 1928 by Yuba only, in 1929-1932 by Nevada only, and in 1931-1936 and 1939-1941 by Nevada and Sacramento, and only ranked 14th in 1943.

Commercial production for 1943 was as follows:

Substance	*Amount*	*Value*
Clay (pottery)	105,815 tons	$236,396
Copper	624,336 lbs.	81,164
Gold	2,606 fine ozs.	91,210
Lead	1,429 lbs.	107
Silver	2,260 fine ozs.	1,607
Miscellaneous stone	------	26,426
Unapportioned *	------	97,188
Total value		$534,098

* Includes brick, manganese, soapstone.

BUTTE

Land area: 1,722 square miles.
Population: 42,840 (1940 census).
Location: North-central portion of State.
County seat: Oroville.
References: State Mineralogist Report XV:XVII:XVIII:XXIV:XXVI (Oct., 1930):XXXI (Jan., 1936).

Butte County ranked thirty-fifth in regard to value of mineral output in 1943 with nine different substances, having a total value of $755,968 compared with $2,400,858 in 1942.

Commercial production for 1943 was as follows:

Substance	*Amount*	*Value*
Copper	127,321 lbs.	$16,552
Gold	15,004 fine ozs.	525,140
Lead	15,156 lbs.	1,136
Silver	7,176 fine ozs.	5,103
Miscellaneous stone	------	105,281
Zinc	814,458 lbs.	87,961
Unapportioned *	------	14,795
Total value		$755,968

* Includes mineral water and platinum.

CALAVERAS

Land area: 1027 square miles.
Population: 8,221 (1940 census).
Location: East-central portion of State—Mother Lode District.
County seat: San Andreas.
References: State Mineralogist Report XIV:XVII:XVIII:XIX:XX:XXI:XXXII (July, 1936):XXXV:XXXVII.

Calaveras County ranked twentieth in California in regard to value of mineral output in 1943, with a total of $2,831,543, as compared with $2,998,235 in 1942.

Commercial production for 1943 consisting of twelve different substances, was as follows:

Substance	*Amount*	*Value*
Copper	4,187,236 lbs.	$544,341
Gold	2,756 fine ozs.	96,460
Lead	107,665 lbs.	8,074
Silver	37,703 fine ozs.	26,811
Miscellaneous stone	------	95,180
Zinc	1,334,625 lbs.	144,140
Unapportioned *	------	1,916,537
Total value		$2,831,543

* Includes cement, chromite, clay (pottery), gem (quartz), manganese ore.

COLUSA

Land area: 1140 square miles.
Population: 9,788 (1940 census).
Location: Sacramento Valley.
County seat: Colusa.
References: State Mineralogist Report XIV:XVII:XVIII:XXV (April, 1929):XXXV.

Colusa County ranked fiftieth in regard to value of mineral output in 1943, with two different mineral substances, worth a total of $93,486, as compared with $41,710 in 1942.

Commercial production for 1943 consisted of quicksilver and miscellaneous stone.

CONTRA COSTA

Land area: 714 square miles.
Population: 100,450 (1940 census).
Location: East side of San Francisco Bay.
County seat: Martinez.
References: State Mineralogist Report XVII : XVIII : XXIII (Jan., 1927) : XXXV.

Contra Costa County stands fifteenth on the list in respect to value of mineral output for 1943, with nine different substances worth $4,284,821 as compared with $4,066,476 in 1942.

Commercial production for 1943 was as follows:

Substance	*Amount*	*Value*
Miscellaneous stone	----	$1,171,432
Unapportioned *	----	3,113,389
Total value		$4,284,821

* Includes brick and hollow tile, cement, clay (pottery), mineral water, natural gas, quicksilver, silica (glass sand).

DEL NORTE

Land area: 1024 square miles.
Population: 4,745 (1940 census).
Location: Extreme northwest corner of State.
County seat: Crescent City.
References: State Mineralogist Report XIV : XVII : XXI (July, 1925) :XXIX (Jan.-April, 1933) : XXXIV : XXXV : XXXVII.

Del Norte County was in thirty-seventh place as to mineral production for 1943 with three different substances worth $609,664, as compared with $401,253 in 1942.

Commercial production in 1943 was as follows:

Substance	*Amount*	*Value*
Miscellaneous stone	----	$42,537
Unapportioned *	----	567,127
Total value		$609,664

* Includes chromite and quicksilver.

EL DORADO

Land area: 1753 square miles.
Population: 13,229 (1940 census).
Location: East-central portion of the State, northernmost of the Mother Lode counties.
County seat: Placerville.
References: State Mineralogist Report XV : XVII : XVIII : XIX : XX : XXII (Oct., 1926) : XXXI : XXXIV (July, 1938) : XXXV : XXXVIII.

El Dorado, which contains the location where gold in California was first heralded to the world, comes forty-third on the list of counties ranked according to value for 1943, with ten different mineral substances worth $304,449. In addition to the segregated figures here given, a large tonnage of limestone was formerly shipped for use in cement manufacture, the value being included in the State's total for cement. The 1942 output was valued at $1,320,250.

Commercial production for 1943 was as follows:

Substance	*Amount*	*Value*
Copper	20,282 lbs.	$2,637
Gold	144 fine ozs.	5,040
Silver	426 fine ozs.	303
Unapportioned *	-----	296,469
Total value		$304,449

* Includes chromite, lead, limestone, slate, soapstone, miscellaneous stone.

FRESNO

Land area: 5950 square miles.
Population: 178,565 (1940 census).
Location: South-central portion of State.
County seat: Fresno.
References: State Mineralogist Report XIV : XVII : XVIII : XXV (July, 1929) : XXXV : XXXVII.

Fresno County, third in importance as a mineral producer among the counties of California, reports an output for 1943 of twelve different

mineral substances, with a total value of $41,039,427, as compared with the 1942 value of $24,790,524.

Commercial production for 1943 was as follows:

Substance	Amount	Value
Gold	36 fine ozs.	$1,260
Natural gas	48,944,169 M. cu. ft.	2,793,749
Petroleum	37,869,219 bbls.	37,779,881
Quicksilver	32 flasks	5,930
Silver	4 fine ozs.	3
Miscellaneous stone	-------	257,252
Tungsten	2,888 units.	79,105
Unapportioned *	-------	122,247
Total value		$41,039,427

* Includes chromite, feldspar, gem, granite.

GLENN

Land area: 1259 square miles.
Population: 12,195 (1940 census).
Location: West side of Sacramento Valley.
County seat: Willows.
References: State Mineralogist Report XIV : XVII : XVIII : XXXV : XXXVII.

Glenn County stands thirty-first as a mineral producing county of the State for 1943, and owes its position to the presence of large deposits of sand and gravel, much of which is used as railroad ballast, and chromite.

Commercial production for 1943 totaled $915,030 which is an increase from $504,755, the 1942 total.

Substance	Amount	Value
Miscellaneous stone	----	$68,113
Other minerals	----	846,917
Total value		$915,030

HUMBOLDT

Land area: 3634 square miles.
Population: 45,812 (1940 census).
Location: Northwestern portion of State, bordering on Pacific Ocean.
County Seat: Eureka.
References: State Mineralogist Report XIV : XVII : XVIII : XXI (July, 1925) : XXXV : XXXVII (Oct., 1941).

Humboldt County ranked forty-seventh in the value of its mineral output among the counties of the State for 1943 with nine different mineral substances valued at $237,827, compared with the 1942 output worth $294,805.

Commercial production for 1943 was as follows:

Substance	Amount	Value
Gold	199 fine ozs.	$6,965
Silver	28 fine ozs.	20
Miscellaneous stone	---	176,906
Unapportioned *	---	53,936
Total value		$237,827

* Includes brick, clay (pottery), manganese ore, natural gas.

IMPERIAL

Land area: 4089 square miles.
Population: 59,740 (1940 census).
Location: Extreme southeast corner of the State.
County seat: El Centro.
References: State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXII (April, 1926) : XXXIV-XXXVI (inc.), XXXVIII (April, 1942).

Imperial County ranks thirty-sixth in total value of mineral output for 1943, with seven different mineral substances, worth $685,203, compared with $507,130 for 1942.

Commercial production for 1943 was as follows:

Substance	*Amount*	*Value*
Miscellaneous stone	---	$99,452
Unapportioned *	---	585,751
Total value		$685,203

* Includes carbon dioxide, gems (Iceland spar), gypsum, manganese ore, kyanite, strontium.

INYO

Land area: 10,019 square miles.
Population: 7625 (1940 census).
Location: Lies on eastern border of State, north of San Bernardino County.
County seat: Independence.
References: State Mineralogist Report XV : XVII : XVIII : XX : XXII (Oct., 1926) : XXVII : XXX : XXXIII : XXXIV (Oct., 1938) : XXXV-XXXVII (inc.).

Inyo County's mineral output for 1943 reached a total value of $8,025,406, having eighteen different mineral substances and standing tenth among the counties of the State as to value of production. The 1942 yield was worth $8,134,848.

Commercial production for 1943 was as follows:

Substance	*Amount*	*Value*
Copper	973,870 lbs.	$126,603
Gold	4,375 fine ozs.	153,125
Lead	11,400,763 lbs.	855,057
Silver	384,899 fine ozs.	273,706
Talc	29,614 tons	401,745
Miscellaneous stone	------	5,870
Tungsten	213,700 units	4,841,322
Zinc	1,064,722 lbs.	114,990
Unapportioned *	------	1,252,988
Total value		$8,025,406

* Includes borates, limestone, manganese ore, molybdenum ore, pumice, quicksilver, soda.

KERN

Land area: 8003 square miles.
Population: 135,124 (1940 census).
Location: South-central portion of State.
County seat: Bakersfield.
References: State Mineralogist Report XIV : XVII : XVIII : XIX XX : XXV (Jan., 1929) : XXIX (July-Oct., 1933) : XXX : XXXIV : XXXVII (inc.).

Kern County, because of its immensely productive oil fields, for many years stood preeminent among all counties of California in the value of its mineral output. It was surpassed by Los Angeles and Orange counties in 1923, but by Los Angeles only in 1924-1943, for which petroleum is responsible. The 1943 production consisted of eighteen different mineral substances valued at $94,245,359, compared with the 1942 output worth $75,529,067. Commercial production for 1943 was as follows:

Substance	*Amount*	*Value*
Clay (pottery and oil-well drilling mud)	96,619 tons	$261,243
Copper	2,726 lbs.	354
Gold	2,963 fine ozs.	103,705
Gypsum	250,989 tons	338,049
Natural gas	15,576,727 M cu. ft.	3,395,175
Petroleum	84,934,943 bbls.	86,174,973
Silver	10,239 fine ozs.	7,281
Miscellaneous stone	------	190,064
Tungsten	2,112 units	57,697
Zinc	14,214 lbs.	1,535
Unapportioned *	------	3,715,283
Total value		$94,245,359

* Includes bentonite, borates, brick, cement, lead, volcanic ash, salt.

KINGS

Land area: 1559 square miles.
Population: 35,168 (1940 census).
Location: South-central portion of the State.
County seat: Hanford.
References: State Mineralogist Report IX : XVII : XVIII : XXVI (Oct., 1930) : XXXV.

Kings County, previous to the discovery of Kettleman Hills oil fields in 1928, had little or no mineral output, but in 1929 it ranked seventh in total value of annual mineral production, seventh in 1930, 1938 and 1941-1942; third in 1931; eighth in 1936-1937, and 1943; sixth in 1939.

Commercial production for 1943 was as follows:

Substance	*Amount*	*Value*
Natural gas	67,277,904 M cu. ft.	$3,035,350
Petroleum	10,326,575 bbls.	12,907,422
Miscellaneous stone	------	72,175
Other minerals	------	748
Total value		$16,015,695

LAKE

Land area: 1278 square miles.
Population: 8,069 (1940 census).
Location: About fifty miles north of San Francisco Bay and the same distance inland from the Pacific Ocean.
County seat: Lakeport.
References: State Mineralogist Report XIV : XVII : XVIII : XX : XXV (July, 1929) : XXXIV : XXXV.

Lake County was in thirty-third place as to the value of mineral output for 1943, with five different mineral substances, worth $798,381, compared with $832,712 in 1942.

Commercial production in 1943 was as follows:

Substance	Amount	Value
Mineral water	8,625 gals.	$3,073
Quicksilver	4,206 flasks	774,813
Miscellaneous stone	----	15,415
Unapportioned *	----	5,080
Total value		$798,381

* Includes chromite and manganese ore.

LASSEN

Land area: 4531 square miles.
Population: 14,479 (1940 census).
Location: Northeast portion of State.
County seat: Susanville.
References: State Mineralogist Report XV : XVII : XVIII : XIX : XXV (Jan., 1929) : XXX : XXXII (Oct., 1936).

Lassen County was in fifty-seventh place as a mineral producer for 1943, with an output of $25,353, compared with $35,236 which was the value for the previous year.

Commercial production for 1943 included granite and miscellaneous stone.

LOS ANGELES

Land area: 4067 square miles.
Population: 2,785,643 (1940 census).
Location: One of the southwestern coast counties.
County seat: Los Angeles.
References: State Mineralogist Report XV : XVII : XVIII : XIX : XX : XXIII (July, 1927) : XXX : XXXIII (July, 1937) : XXXIV-XXXVI.

The mineral production of Los Angeles County for the year 1943 amounted in value to $100,688,245, as compared with the 1942 total worth $106,120,578. This accounted for 24% of the entire State's total for 1943 and ranked Los Angeles first in the State as a mineral producer.

Commercial production for 1943 consisted of fifteen substances and was as follows:

Substance	Amount	Value
Brick	55,200 M	$2,046,334
Hollow building tile	1,587 tons	15,784
Clay (pottery and oil-well drilling mud)	39,910 tons	53,454
Gold	97 fine ozs.	3,395
Mineral water	10,640,218 gals.	349,173
Natural gas	54,480,234 M cu. ft.	3,894,849
Petroleum	87,983,756 bbls.	90,193,521
Silver	17 fine ozs.	12
Miscellaneous stone	------	2,808,592
Unapportioned *	------	1,323,131
Total value		$100,688,245

* Includes cement, copper, diatomite, dolomite, iodine, limestone, salt, silica (gannister), titanium.

MADERA

Land area: 2112 square miles.
Population: 23,314 (1940 census).
Location: East-central portion of State.
County seat: Madera.

References: State Mineralogist Report XIV : XVII : XVIII : XXIV (Oct., 1928) : XXX : XXXI : XXXIV : XXXVII : XXXVIII.

Madera County was in fifty-fifth place as a mineral producer for 1943, with an output of seven different mineral substances valued at $55,575, compared with $87,727 for 1942.

Commercial production for 1943 was as follows:

Substance	*Amount*	*Value*
Copper	21,940 lbs.	$2,852
Gold	10 fine ozs.	350
Silver	128 fine ozs.	91
Unapportioned *	------	52,282
Total value		$55,575

* Includes natural gas, volcanic ash, miscellaneous stone, tungsten.

MARIN

Land area: 529 square miles.
Population: 52,907 (1940 census).
Location: Adjoins San Francisco on the north.
County Seat: San Rafael.
References: State Mineralogist Report XIV : XVII : XVIII : XXII (July, 1926) : XXIX : XXXV.

Marin County had forty-fifth place as to the value of mineral output for 1943, with five different mineral substances. The total was $280,119, compared with $229,269 in 1942.

Commercial production included clay (pottery), mineral water, manganese ore, crushed rock, and sand and gravel.

MARIPOSA

Land area: 1453 square miles.
Population: 5,605 (1940 census).
Location: Most southerly of the Mother Lode counties. East central portion of State.
County seat: Mariposa.
References: State Mineralogist Report XIV : XVII : XVIII : XXIV (April, 1928) : XXXI (Jan., 1935) : XXXV : XXXVII.

Mariposa County is one of the distinctly *mining* counties of the State, although it stands but thirty-ninth on the list of counties in regard to the value of its mineral output for 1943, with a total of $443,693, as compared with $1,321,238 for 1942. Mariposa County is also the source of a large tonnage of limestone annually, which is otherwise credited to cement manufacture in Merced County.

Commercial production with nine different mineral substances for 1943, was as follows:

Substance	*Amount*	*Value*
Gold	6,489 fine ozs.	$227,115
Silver	1,731 fine ozs.	1,231
Miscellaneous stone	----	4,120
Unapportioned *	----	211,227
Total value		$443,693

* Includes barite, copper, lead, manganese ore, silica (quartz), tungsten.

MENDOCINO

Land area: 3452 square miles.
Population: 27,864 (1940 census).
Location: Joins Humboldt County on the south and bounded by the Pacific Ocean on the west.
County seat: Ukiah.
References: State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXXV.

Mendocino County's mineral output for 1943 was valued at $82,480 which gave it rank of fifty-first among the counties of the State as a mineral producer with $133,995 for 1942.

Commercial production for 1943 was as follows:

Substance	*Value*
Miscellaneous stone	$43,174
Unapportioned *	39,306
Total value	$82,480

* Includes carbon dioxide, chromite, manganese ore, natural gas.

MERCED

Land area: 1995 square miles.
Population: 46,988 (1940 census).
Location: About the geographical center of the State.
County seat: Merced.
References: State Mineralogist Report XIV : XVII : XVIII : XXI (April, 1925) : XXXI (Jan., 1935) : XXXV.

Merced County ranked twenty-seventh as to the value of mineral output for 1943, with five different mineral substances worth $1,118,313, compared with $1,848,319 for 1942.

Commercial production for 1943 was as follows:

Substance	*Amount*	*Value*
Gold	81 fine ozs.	$2,835
Silver	28 fine ozs.	20
Unapportioned *	--	1,115,458
Total value		$1,118,313

* Includes cement, platinum, miscellaneous stone.

MODOC

Land area: 3823 square miles.
Population: 8,713 (1940 census).
Location: The extreme northeast corner of the State.
County seat: Alturas.
References: State Mineralogist Report XV : XVII : XVIII : XXV (Jan., 1929) : XXX : XXXII (Oct., 1936) : XXXV.

Modoc County in fifty-sixth place for 1943, reported a commercial production as follows:

Substance	*Value*
Stone, miscellaneous	$28,691

MONO

Land area: 3030 square miles.
Population: 2,299 (1940 census).
Location: Is bordered by the State of Nevada on the east and is about in the central portion of the State measured on a north and south line.
County seat: Bridgeport.
References: State Mineralogist Report XV : XVII : XVIII : XX : XXIII (Oct., 1927) : XXX : XXXIV : XXXV : XXXVI (April, 1940) : XXXVII : XXXVIII.

Mono County is fifty-fourth with eight different mineral substances, and reported a commercial production for 1943 as follows:

Substance	*Amount*	*Value*
Copper	10,170 lbs.	$1,322
Gold	8 fine ozs.	280
Lead	4,034 lbs.	303
Silver	599 fine ozs.	426
Miscellaneous stone	-----	3,665
Unapportioned *	-----	50,209
Total value		$56,205

* Includes pumice, andalusite, tungsten.

MONTEREY

Land area: 3330 square miles.
Population: 73,032 (1940 census).
Location: West-central portion of State, bordering on Pacific Ocean.
County seat: Salinas.
References: State Mineralogist Report XV : XVII : XVIII : XIX : XXI (Jan., 1925) : XXXI : XXXIV : XXXV.

Monterey County had seven different mineral substances during 1943, having a total value of $1,142,800, as compared with $576,152 for 1942.

In twenty-sixth place, commercial production for 1943 was as follows:

Substance	*Value*
Miscellaneous stone	$587,681
Unapportioned *	555,119
Total value	$1,142,800

* Includes dolomite, quicksilver, salt, sandstone, silica (glass sand).

NAPA

Land area: 783 square miles.
Population: 28,503 (1940 census).
Location: Directly north of San Francisco Bay—one of the 'bay counties.'
County seat: Napa.
References: State Mineralogist Report XIV : XVII : XVIII : XX : XXV (April, 1929) : XXXV.

In 1943 the value of Napa County's mineral output was $948,557 placing it in thirtieth place on the list of counties, as compared with $1,447,638 for 1942.

With six different mineral substances, commercial production for 1943 was as follows:

Substance	Amount	Value
Mineral water	33,506 gals.	$3,569
Quicksilver	2,023 flasks	363,017
Unapportioned *	------	581,971
Total value		$948,557

* Includes asbestos, pumice, miscellaneous stone.

NEVADA

Land area: 974 square miles.
Population: 19,283 (1940 census).
Location: North of Lake Tahoe on the eastern border of the State.
County seat: Nevada City.
References: State Mineralogist Report XVI : XVII : XVIII : XIX : XX : XXVI (April, 1930) : XXXI : XXXII : XXXV : XXXVII (July, 1941).

Nevada County, one of the mountain counties of California, for some years alternated with Amador in the gold lead, but both were passed by Yuba in 1918-1921, also 1923 and 1943. In 1922, 1924, 1929 to 1942, Nevada led all counties in gold output, though it held third place in 1925 and 1928, and second place in 1926, 1927 and 1943. Nevada County stands thirty-second on the list of counties in regard to value of its mineral output for 1943 with ten different mineral substances worth $890,647, as compared with $5,956,238 for 1942.

Commercial production for 1943 was as follows:

Substance	Amount	Value
Copper	4,547 lbs.	$591
Gold	21,483 fine ozs.	751,905
Lead	18,346 lbs.	1,376
Silver	103,451 fine ozs.	73,565
Miscellaneous stone	------	14,203
Unapportioned *	------	49,007
Total value		$890,647

* Includes barite, chromite, manganese ore, tungsten.

ORANGE

Land area: 795 square miles.
Population: 130,760 (1940 census).
Location: Southwest portion of the State, bordering Pacific Ocean.
County seat: Santa Ana.
References: State Mineralogist Report XV : XVII : XVIII : XIX : XX : XXI (Jan., 1925) : XXXI : XXXV : XXXVII.

Orange County, in fourth place as to value of mineral output for 1943, produced eleven mineral substances, worth $28,068,896 compared with $27,508,497 in 1942.

Commercial production for 1943 was as follows:

Substance	Amount	Value
Clay (pottery)	38,039 tons	$160,389
Natural gas	15,705,073 M. cu. ft.	1,079,728
Petroleum	26,441,558 bbls.	26,325,466
Silver	415 fine ozs.	295
Miscellaneous stone	------	458,665
Unapportioned *	------	44,353
Total value		$28,068,896

* Includes brick, copper, lead, mineral water, silica (glass sand).

PLACER

Land area: 1395 square miles.
Population: 28,108 (1940 census).
Location: Eastern border of State directly west of Lake Tahoe.
County seat: Auburn.
References: State Mineralogist Report XV : XVII : XVIII : XIX : XX : XXIII (July, 1927) : XXXI : XXXII (Jan., 1936).

Placer County, in forty-sixth place, with thirteen different mineral substances, had a commercial production for 1943 as follows, compared with $1,335,034 the previous year:

Substance	*Amount*	*Value*
Copper	4,088 lbs.	$531
Gold	1,260 fine ozs.	44,100
Silver	512 fine ozs.	364
Miscellaneous stone	----	27,548
Unapportioned *	----	204,740
Total value		$277,283

* Includes asbestos, brick, chromite, clay (pottery), granite, lead, manganese ore, mineral water.

PLUMAS

Land area: 2594 square miles.
Population: 11,548 (1940 census).
Location: Northeastern border of State, south of Lassen County.
County seat: Quincy.
References: State Mineralogist Report XVI : XVII : XVIII : XIX : XX : XXIV (Oct., 1928) : XXIX : XXX : XXXIII (April, 1937), XXXVII.

Plumas County's mineral output for 1943 with eight different mineral substances was valued at $207,509, as compared with $346,936 in 1942.

In forty-eighth place, commercial production for 1943 was as follows:

Substance	*Amount*	*Value*
Copper	13,252 lbs.	$1,723
Gold	214 fine ozs.	7,490
Lead	3,931 lbs.	295
Silver	602 fine ozs.	428
Miscellaneous stone	-----	91,547
Other minerals	-----	106,026
Total value		$207,509

RIVERSIDE

Land area: 7240 square miles.
Population: 105,524 (1940 census).
Location: Southern portion of State.
County seat: Riverside.
References: State Mineralogist Report XV : XVII : XVIII : XX : XXV (Oct., 1929) : XXX : XXXI : XXXIV-XXXVII, (inc.).

Riverside is the fourth county in the State in size and the twelfth in regard to the total value of mineral output for 1943. Within its borders are included mountains, desert, and agricultural land. In point of variety Riverside County showed twelve different mineral substances commercially produced in 1943 with a total value of $5,452,740, as compared with the 1942 output which was valued at $7,271,099.

Commercial production for 1943 was as follows:

Substance	*Amount*	*Value*
Clay (pottery)	120,574 tons	$214,918
Miscellaneous stone	------	483,498
Unapportioned *	------	4,754,324
Total value		$5,452,740

* Includes brick and hollow tile, cement, granite, gypsum, limestone, manganese ore, mineral water, silica (glass sand), tungsten.

SACRAMENTO

Land area: 983 square miles.
Population: 170,333 (1940 census).
Location: North-central portion of State.
County seat: Sacramento.
References: State Mineralogist Report XV : XVII : XVIII : XX : XXI (Jan., 1925) : XXXI.

Sacramento stands eleventh among the counties of the State as a mineral producer; the output for 1943 being valued at $6,588,998, as compared with the 1942 production worth $9,884,746. In regard to gold output alone, this county ranks third, being exceeded by Yuba and Nevada, the Sacramento product coming from the dredges. With ten different mineral substances, commercial production for 1943 was as follows:

Substance	*Amount*	*Value*
Gold	16,156 fine ozs.	$565,460
Natural gas	62,766,484 M. cu. ft.	4,767,138
Silver	810 fine ozs.	576
Miscellaneous stone	------	1,082,427
Unapportioned *	------	173,397
Total value		$6,588,998

* Includes brick and hollow tile, clay (pottery), granite, platinum, paving blocks.

SAN BENITO

Land area: 1392 square miles.
Population: 11,392 (1940 census).
Location: West-central portion of State.
County seat: Hollister.
References: State Mineralogist Report XV : XVII : XVIII : XX : XXII (April, 1926) : XXXIV : XXXV.

San Benito County ranked seventeenth among the counties in regard to the value of total mining production for 1943, having an output worth $3,528,462, as compared with $3,104,054 for the previous year.

Commercial output for 1943 included cement, chromite, dolomite, manganese ore, quicksilver, sand, gravel, and crushed rock.

SAN BERNARDINO

Land area: 20,157 square miles.
Population: 161,108 (1940 census).
Location: Southeastern portion of State.
County seat: San Bernardino.
References: State Mineralogist Report XV : XVII : XVIII : XIX : XXVI (July, 1930) : XXVII (July, 1931) : XXX : XXXIV-XXXVIII (inc.) : XXXIX (Oct., 1943).

San Bernardino, by far the largest county in the State in area, ranked sixth in regard to the value of mineral output for 1943, with a total of $22,042,939, as compared with $24,638,661, the total for 1942.

San Bernardino, for many years (except for 1918) had led all other counties in the State in point of variety of minerals, producing commercially in 1943 a total of thirty different substances.

Substance	*Amount*	*Value*
Copper	85,875 lbs.	11,164
Gold	2,352 fine ozs.	82,320
Iron ore	804,248 tons	1,721,827
Lead	239,514 lbs.	17,963
Limestone	50,614 tons	142,099
Silver	8,910 fine ozs.	6,336
Talc	32,666 tons	318,023
Miscellaneous stone	———	937,463
Tungsten	28,172 units	772,226
Zinc	1,465,134 lbs.	158,234
Unapportioned *	———	17,875,284
Total value		$22,042,939

* Includes bentonite, borates, brick, bromine, calcium chloride, cement, clay (pottery), feldspar, gem, granite, lithia, manganese ore, mineral water, petroleum, potash, salt, silica (quartz and ganister), soda, strontium.

SAN DIEGO

Land area: 4221 square miles.
Population: 289,348 (1940 census).
Location: Extreme southwest corner of State.
County seat: San Diego.
References: State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXI (July, 1925) : XXX : XXXV (Jan., 1939) : XXXVI-XXXVII.

San Diego ranked twenty-third in the total value of its mineral output for the year 1943 with eleven different mineral substances on the commercial list. The value for 1943 was $1,650,586, as compared with the 1942 output worth $1,188,661.

Commercial production for 1943 was as follows:

Substance	*Value*
Miscellaneous stone	$1,296,838
Unapportioned *	353,748
Total value	$1,650,586

* Includes bentonite, brick, bromine, clay (pottery), granite, magnesium chloride, mineral water, salt, tube-mill pebbles.

SAN FRANCISCO

Land area: 46½ square miles.
Population: 634,536 (1940 census).
County seat: San Francisco.
References: State Mineralogist Report XVII : XVIII : XX : XXV (April, 1929) : XXXV : XXXVII.

Surprising as it may appear at first glance, San Francisco County is listed among the mineral-producing sections of the State, actual production consisting mainly of crushed rock, sand, gravel, mineral water and gold and silver from beach sands.

In fortieth place, commercial production for 1943 had a total value of $432,500 and was miscellaneous stone.

SAN JOAQUIN

Land area: 1448 square miles.
Population: 134,207 (1940 census).
Location: Central portion of State.
County seat: Stockton.
References: State Mineralogist Report XIV : XVII : XVIII : XXI (April, 1925).

San Joaquin County reported a mineral production for 1943 having a total value of $1,621,661, as compared with $2,079,078 for 1942.

In twenty-fourth place, commercial production for 1943 was as follows:

Substance	*Amount*	*Value*
Gold	5,070 fine ozs.	$177,450
Natural gas	12,446,567 M cu. ft.	888,205
Silver	512 fine ozs.	364
Miscellaneous stone	----	408,304
Unapportioned *	----	147,338
Total value		$1,621,661

* Includes brick and hollow tile, manganese ore, platinum.

SAN LUIS OBISPO

Land area: 3334 square miles.
Population: 33,246 (1940 census).
Location: Bordered by Kern County on the east and the Pacific Ocean on the west.
County seat: San Luis Obispo.
References: State Mineralogist Report XV : XVII : XVIII : XXI (Oct., 1925) : XXXI (Oct., 1935) : XXXV : XXXVII.

The total value of the mineral production of San Luis Obispo County in 1943, with eight different mineral substances, was $1,037,062, as compared with $1,031,114 in 1942.

In twenty-ninth place, commercial production for 1943 was as follows:

Substance	*Amount*	*Value*
Quicksilver	2,625 flasks	$478,442
Miscellaneous stone	----	77,412
Unapportioned *	----	481,008
Total value		$1,037,062

* Includes brick and hollow tile, chromite, manganese ore, mineral water, petroleum, volcanic ash.

SAN MATEO

Land area: 447 square miles.
Population: 111,782 (1942 census).
Location: Peninsula, adjoined by San Francisco on the north.
County seat: Redwood City.
References: State Mineralogist Report XVII : XVIII : XXV (April, 1929) : XXIX : XXXV.

San Mateo County had a mineral output in 1943 of five different substances, having a total value of $3,041,434, as compared with $3,874,496, the value for 1942.

In eighteenth place, commercial production for 1943 was as follows:

Substance	*Value*
Miscellaneous stone	$165,363
Unapportioned *	2,876,071
Total value	$3,041,434

* Includes cement, limestone (shells), magnesium salts.

SANTA BARBARA

Land area: 2740 square miles.
Population: 70,555 (1940 census).
Location: Southwestern portion of State, adjoining San Luis Obispo on the south.
County seat: Santa Barbara.
References: State Mineralogist Report XV : XVII : XVIII : XIX : XXI (Oct., 1925) : XXXII : XXXV.

Santa Barbara County owes its position of seventh place in the State in regard to its mineral output to the presence of productive oil fields within its boundaries. The total value of its mineral production during the year 1943 was $16,830,725, as compared with $11,415,045, the output for 1942.

With eight different substances, commercial production for 1943 was as follows:

Substance	*Amount*	*Value*
Natural gas	4,052,577 M cu. ft.	$298,960
Petroleum	16,285,344 bbls.	13,523,527
Miscellaneous stone	-------	310,640
Unapportioned *	-------	2,697,598
Total value		$16,830,725

* Includes brick, diatomite, mineral water, quicksilver, bituminous rock.

SANTA CLARA

Land area: 1328 square miles.
Population: 174,949 (1940 census).
Location: West-central portion of State.
County seat: San Jose.
References: State Mineralogist Report XVII : XVIII : XX : XXVI (Jan., 1930) : XXIX : XXXV.

Santa Clara County reported a mineral output for 1943 of $8,128,250, as compared with $9,204,217, the figure for 1942.

In ninth place, with ten mineral substances, commercial production for 1943 was as follows:

Substance	*Amount*	*Value*
Limestone (part shells)	161,003 tons	$258,502
Quicksilver	1,736 flasks	322,871
Miscellaneous stone	-------	381,910
Unapportioned *	-------	7,164,967
Total value		$8,128,250

* Includes brick, cement, clay (pottery), magnesite, manganese ore, petroleum.

SANTA CRUZ

Land area: 435 square miles.
Population: 45,057 (1940 census).
Location: Bordering Pacific Ocean, just south of San Mateo County.
County seat: Santa Cruz.
References: State Mineralogist Report XVII : XVIII : XXII (Jan., 1926) : XXIX.

The mineral output of Santa Cruz County amounted to a total of $2,900,752 for 1943, giving the county a standing of nineteenth among all others in the State in this regard. The 1942 figure was $3,506,972.

Commercial production for 1943 was as follows:

Substance	*Amount*	*Value*
Limestone	24,372 tons	$156,703
Unapportioned *	------	2,744,049
Total value		$2,900,752

* Includes cement, iron ore, miscellaneous stone, bituminous rock.

SHASTA

Land area: 3858 square miles.
Population: 28,800 (1940 census).
Location: North-central portion of State.
County seat: Redding.
References: State Mineralogist Report XIV : XVII : XVIII : XIX : XXII (April, 1926) : XXIX (Jan., April, 1933) : XXX : XXXIV : XXXV (April, 1939) : XXXVI.

Shasta County stood sixteenth in California among the mineral-producing counties in 1943, with an output valued at $3,766,717, as compared with the 1942 production worth $4,025,223.

With twelve different mineral substances, commercial production for 1943 was as follows:

Substance	*Amount*	*Value*
Copper	1,380,149 lbs.	$179,419
Gold	2,162 fine ozs.	75,670
Lead	9,523 lbs.	714
Silver	31,957 fine ozs.	22,725
Miscellaneous stone	------	2,259,567
Zinc	477,474 lbs.	51,567
Unapportioned *	------	1,177,055
Total value		$3,766,717

* Includes chromite, iron ore, manganese ore, mineral water, pyrite.

SIERRA

Land area: 923 square miles.
Population: 3025 (1940 census).
Location: Eastern border of State just north of Nevada County.
County seat: Downieville.
References: State Mineralogist Report XVI : XVII : XVIII : XX : XXV (April, 1929) : XXXI, XXXVIII (Jan., 1942).

Sierra County reported a mineral production of $176,016 in 1943, which was mainly gold, as compared with the 1942 output, worth $640,895.

In forty-ninth place, commercial production for 1943 was as follows:

Substance	Amount	Value
Gold	4,669 fine ozs.	$163,415
Silver	820 fine ozs.	583
Unapportioned *	---	12,018
Total value		$176,016

* Includes chromite, platinum, miscellaneous stone.

SISKIYOU

Land area: 6256 square miles.
Population: 28,598 (1940 census).
Location: Extreme north-central portion of State, next to Oregon boundary.
County seat: Yreka.
References: State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXI (Oct., 1925) : XXVIII (Jan., 1931) : XXIX : XXX : XXXI (July, 1935) : XXXIV : XXXV : XXXVII.

Siskiyou, fifth county in California in regard to size, located in highly mineralized and mountainous country, ranks twenty-first in regard to mineral output with nine mineral substances for 1943. The 1942 production was valued at $1,620,514.

Commercial production for 1943 was as follows:

Substance	Amount	Value
Copper	9,707,958 lbs.	$1,262,035
Gold	3,144 fine ozs.	110,040
Silver	9,439 fine ozs.	6,712
Miscellaneous stone	---	221,837
Unapportioned *	---	295,622
Total value		$1,896,246

* Includes manganese ore, mineral water, quicksilver.

SOLANO

Land area: 822 square miles.
Population: 49,118 (1940 census).
Location: Touching San Francisco Bay on the northeast.
County seat: Fairfield.
References: State Mineralogist Report XIV : XVII : XXIII (April, 1927) : XXXV.

Solano, while mostly valley land, produced mineral substances during 1943 to the total value of $4,931,944, ranking it fourteenth place among the counties of the State, compared with the 1941 output worth $2,720,428.

Commercial production for 1943 was as follows:

Substance	Amount	Value
Natural gas	56,605,382 M cu. ft.	$4,780,407
Miscellaneous stone	---	151,537
Total value		$4,931,944

SONOMA

Land area: 1577 square miles.
Population: 69,052 (1940 census).
Location: South of Mendocino County, bordering on the Pacific Ocean.
County seat: Santa Rosa.
References: State Mineralogist Report XIV : XVII : XVIII : XXII (July, 1926) : XXXV.

Sonoma County ranked twenty-fifth among the counties of California during 1943 with a mineral output valued at $1,521,314 compared with $1,655,326, the 1942 figure.

Commercial production for 1943 was as follows:

Substance	*Amount*	*Value*
Mineral water	82,189 gals.	$13,943
Quicksilver	4,121 flasks	761,654
Miscellaneous stone	----	737,048
Unapportioned *	----	8,669
Total value		$1,521,314

* Includes chromite and granite (tuff).

STANISLAUS

Land area: 1450 square miles.
Population: 74,866 (1040 census).
Location: Center of State bounded on south by Merced County.
County seat: Modesto.
References: State Mineralogist Report XIV : XVII : XVIII : XXI (April, 1925) : XXXV.

Gold has usually been the chief mineral product of Stanislaus County, but it was exceeded in 1918-1919 by manganese, and in 1921-1923, 1925-1934 and 1943 by miscellaneous stone. This county for 1943 ranked twenty-eighth in the State in regard to minerals, with an output valued at $1,112,486, as compared with $1,475,362 in 1942.

Commercial production for 1943 was as follows:

Substance	*Amount*	*Value*
Gold	7,476 fine ozs.	$261,660
Silver	516 fine ozs.	367
Miscellaneous stone	----	397,616
Unapportioned *	----	452,843
Total value		$1,112,486

* Includes clay (pottery), gems (quartz), magnesite, manganese ore, mineral paint, natural gas, platinum, silica (quartz).

SUTTER

Land area: 608 square miles.
Population: 18,680 (1940 census).
Location: Bounded by Butte County on the north and Sacramento on the south.
County seat: Yuba City.
References: State Mineralogist Report XV : XVII : XVIII.

Sutter is one of only two counties in the State which for a number of years reported no commercial output of some kind of mineral sub-

stance. In 1917 some crushed rock was taken out, from the Marysville Buttes, also in 1925-1928, and 1937-1938.

There has been some utilization of natural gas and clay. Coal is found here, but no deposits of it have been placed on a productive basis.

During 1943 there was a commercial output of pottery clay and natural gas, having a total value of $74,905, which ranked it fifty-second as a mineral-producing county. The 1942 total was $95,438.

TEHAMA

Land drea: 2893 miles.
Population: 14,316 (1940 census).
Location: North-central portion of the State, bounded on the north by Shasta.
County seat: Red Bluff.
References: State Mineralogist Report XV : XVII : XVIII : XIV : XXIV (July, 1928) : XXXVII.

Tehama County stood fifty-third among the mineral-producing counties of the State for 1943, with an output valued at $72,917, compared with $47,533 in 1942. Commercial production in 1943 was chromite, crushed rock, sand and gravel.

TRINITY

Land area: 3166 square miles.
Population: 3970 (1940 census).
Location: Northwestern portion of State.
County seat: Weaverville.
References: State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXII (Jan., 1926) : XXIX (Jan., April, 1933) : XXX : XXXIV : XXXV : XXXVII (Jan., 1941).

Trinity County's output of minerals was valued at $323,123 for 1943, as compared with the 1942 figure of $1,053,442, which gives the county a rank of forty-second for the year.

Commercial production for 1943 was as follows:

Substance	*Amount*	*Value*
Gold	889 fine ozs.	$31,115
Silver	90 fine ozs.	64
Miscellaneous stone	---	51,389
Unapportioned *	---	240,555
Total value		$323,123

* Includes chromite, manganese ore, platinum, quicksilver, coal.

TULARE

Land area: 4856 square miles.
Population: 107,152 (1940 census).
Location: Bounded by Inyo on the east, Kern on the south, Fresno on the north.
County seat: Visalia.
References: State Mineralogist Report XV : XVII : XVIII : XX : XXXVI : XXXVII.

Tulare County stands forty-fourth on the list of mineral-producing counties for 1943, with eight different mineral substances, having a total value of $301,292, as compared with $168,743 for 1942.

Commercial production for 1943 was as follows:

Substance	*Amount*	*Value*
Lead	5,080 lbs.	$381
Silver	486 fine ozs.	346
Miscellaneous stone	--	81,188
Tungsten	5,370 units	108,192
Unapportioned *	----	111,185
Total value		$301,292

* Includes brick and hollow tile, manganese ore, natural gas, petroleum.

TUOLUMNE

Land area: 2190 square miles.
Population: 10,887 (1940 census).
Location: East-central portion of State—Mother Lode District.
County seat: Sonora.
References: State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXIV (Jan., 1928) : XXXIV : XXXV : XXXVII.

Tuolumne County ranks thirty-fourth among the counties of the State relative to its total value of mineral output for 1943, with eight different substances. This county ranked first as a producer of marble in the State. The mineral production for 1943 was valued at $783,508, as compared with $854,080 for 1942.

Commercial production for 1943 was as follows:

Substance	*Amount*	*Value*
Copper	4,933 lbs.	$641
Gold	10,399 fine ozs.	363,965
Silver	3,600 fine ozs.	2,560
Miscellaneous stone	----	67,067
Unapportioned *	------	349,275
Total value		$783,508

* Includes chromite, dolomite, limestone.

VENTURA

Land area: 1878 square miles.
Population: 69,685 (1940 census).
Location: Southwestern portion of State, bordering on Pacific Ocean.
County seat: Ventura.
References: State Mineralogist Report XV : XVII : XVIII : XX : XXI : XXVIII (July-Oct., 1932) : XXXVII.

Ventura is fifth in the State in respect to the value of its mineral output for 1943. The 1943 mineral production was worth $25,080,976, as compared with the 1942 output valued at $23,084,373.

With eight different mineral substances, commercial production for 1943 was as follows:

Substance	*Amount*	*Value*
Natural gas	43,133,041 M cu. ft.	$2,247,380
Petroleum	20,279,921 bbls.	22,400,750
Miscellaneous stone	--------	252,385
Unapportioned *	---------	180,461
Total value		$25,080,976

* Includes clay (oil-well drilling), gypsum, limestone.

YOLO

Land area: 1017 square miles.
Population: 27,243 (1940 census).
Location: Sacramento Valley, bounded by Sutter on the east and Colusa on the north.
County seat: Woodland.
References: State Mineralogist Report XIV : XVII : XVIII : XXXV.

Yolo County in forty-first place, had a commercial production for 1943 as follows, compared with $617,418 the preceding year:

Substance	*Value*
Miscellaneous stone	$38,653
Unapportioned *	326,523
Total value	$365,176

* Includes natural gas and quicksilver.

YUBA

Land area: 639 square miles.
Population: 17,034 (1940 census).
Location: Lies west of Sierra and Nevada counties; south of Plumas.
County seat: Marysville.
References: State Mineralogist Report XV : XVII : XVIII : XX : XXVI (July, 1930) : XXXI.

Yuba County ranked twenty-second among the counties of the State as a mineral producer in respect to gold, which is obtained mainly by dredges. The 1942 output was valued at $3,244,771.

Commercial production for 1943 was as follows:

Substance	*Amount*	*Value*
Gold	38,286 fine ozs.	$1,340,010
Silver	1,717 fine ozs.	1,221
Miscellaneous stone	-----	385,407
Other minerals	-----	8,032
Total value		$1,734,670

CHAPTER EIGHT

DIRECTORY OF PRODUCERS OF METALLIC AND NON-METALLIC MINERALS IN CALIFORNIA 1943

NOTE.—The producers of natural gas and petroleum will be found in the quarterly Summary of Operations, California Oil Fields, for July to December, 1943 (Vol. 29, No. 2).

ASBESTOS

Operator	Product	Address	Location of mine
Napa County			
Kohler & Chase, Geo. Q. Chase	a	26 O'Farrell St., San Francisco	Steel Canyon
Placer County			
S. G. Bowman	b	Forest Hill	Forest Hill

a. Chrysotile short fiber. b. Tremolite.

BARYTES

Operator	Address	Location of mine
Mariposa County		
Baroid Sales Division, National Lead Co.	830 Ducommun St., Los Angeles	El Portal
Nevada County		
Industrial Minerals & Chemical Co., Spanish Mine	836 Gilman St., Berkeley	Washington

BENTONITE (FULLER'S EARTH)

Operator	Address	Location of pit
Inyo County		
Muroc Clay Co.	5525 Randolph St., Maywood	Olancha
Kern County		
Muroc Clay Co.	5525 Randolph St., Maywood	Muroc
San Bernardino County		
Baroid Sales Division, National Lead Co.	830 Ducommun St., Los Angeles	Hector
Pacific Bentonite Mine, Louis Martinez	Box 374, Red Mountain	Red Mountain
San Diego County		
Standard Oil Co. of Calif.	Standard Oil Bldg., San Francisco	Palm Siding

BITUMINOUS ROCK

Operator	Address	Location of mine
Santa Barbara County		
Higgins Quarry, D. A. Sattler, Lessee	856 Arguello Rd., Santa Barbara	Carpinteria
Santa Cruz County		
Calrock Asphalt Co.	232 Montgomery St., San Francisco	Majors

BORATES

Operator	Address	Location of property
Inyo County		
Pacific Alkali Co.	523 W. 6th St., Los Angeles	Bartlett
United States Borax Co.	510 W. 6th St., Los Angeles	Death Valley
Kern County		
Pacific Coast Borax Co.	510 W. 6th St., Los Angeles	Kramer
San Bernardino County		
American Potash and Chemical Corp.	Trona	Trona
West End Chemical Co.	Latham Square Bldg., Oakland	West End

BROMINE

Operator	Address	Location of property
Alameda County		
Westvaco Chlorine Prod. Corp.	405 Lexington Ave., New York, N. Y.	Newark
San Bernardino County		
American Potash & Chem. Co.	Trona	Trona
San Diego County		
Westvaco Chlorine Prod. Corp.	405 Lexington Ave., New York, N. Y.	San Diego

CALCIUM CHLORIDE

Operator	Address	Location of mine
Imperial County		
Mullet Island Salt Works*	Niland	Niland
San Bernardino County		
California Rock Salt Co.	2465 Hunter St., Los Angeles	Amboy

* Idle 1943 owing to flood.

CARBON DIOXIDE GAS

Operator	Address	Location of wells
Imperial County		
National Dry Ice Co.	1225 E. 8th St., Los Angeles	Niland
Natural Carbonic Prod., Inc.	748 E. Washington Blvd., Los Angeles	Niland
Mendocino County		
Caldri Ice Corp.	1168 Battery St., San Francisco	Hopland

CEMENT

Operator	Address	Location of mill
Calaveras County		
Calaveras Cement Co.	315 Montgomery St., San Francisco	San Andreas
Contra Costa County		
Henry Cowell Lime and Cement Co.	2 Market St., San Francisco	Cowell
Kern County		
Monolith Portland Cement Co.	Bartlett Bldg., Los Angeles	Monolith
Los Angeles County		
Blue Diamond Corp.	1650 S. Alameda St., Los Angeles	Los Angeles
Merced County		
Yosemite Portland Cement Co.	Merced	Merced
Riverside County		
Riverside Cement Co.	621 S. Hope St., Los Angeles	Riverside
San Benito County		
Pacific Portland Cement Co.*	417 Montgomery St., San Francisco	San Juan
San Bernardino County		
California Portland Cement Co.	601 W. Fifth St., Los Angeles	Colton
Southwestern Portland Cement Co.	503 Roosevelt Bldg., Los Angeles	Victorville
San Mateo County		
Pacific Portland Cement Co.	417 Montgomery St., San Francisco	Redwood City
Santa Clara County		
Permanente Cement Co.	Latham Square Bldg., Oakland	Permanente
Santa Cruz County		
Santa Cruz Portland Cement Co.	Crocker Bldg., San Francisco	Davenport

* Discontinued operations June 1943.

CHROMITE

Principal Chromite Producers in California Out of a Total of 66 Operating Properties

Operator	Address	Location of mine
Del Norte County		
Crescent Pacific Mining Co., Judy Group	503 Market St., San Francisco	Crescent City
Doe Creek Mine, J. B. Isgrid & G. P. Lilley	Box 352, Crescent City	Crescent City
French Hill Mine, C. H. McClendon	Crescent City	Crescent City
Gillis, Brandi, and Gillis, Copper Creek Mine	Smith River	Smith River
Messenger and Linkhart, Big Five Mine	Cave Junction, Ore.	
High Plateau Group, Eugene R. Brown	O'Brien, Ore.	Crescent City
Pacific Chrome & Manganese Syndicate	667 Mission St., San Francisco	Crescent City
J. K. Remsen	P.O. Box 347, Grants Pass, Ore.	Crescent City
Tyson Chrome Mines, Ltd., Big Dipper & Doe Flat Mines	406 Montgomery St., San Francisco	Crescent City
El Dorado County		
Pilliken Mine, United States Chrome Mines, Inc., A. H. Wild	Russ Bldg., San Francisco	Folsom
Glenn County		
Grey Eagle Mine, Rustless Mining Corp.	Farmers & Mechanics Bldg., Sacramento	Willows
Humboldt County		
Fish Creek Chrome Mine, L. O. Wilder	Orleans	Orleans
Man of War Mine, Griffith Mining and Development Company	Downieville	Orleans
Dorothea Reddy Moroney	Klamath River	Orleans
Mendocino County		
Ray F. Helmke	Garberville	Longvale
Plumas County		
White Pine Mine, E. R. Patterson	Oakley	Quincy
San Luis Obispo County		
Castro Chrome Associates	232 Montgomery St., San Francisco	San Luis Obispo
Shasta County		
Little Castle Creek Chrome Mine, Manley M. Brown	Dunsmuir	Dunsmuir
Montrose Mining & Milling Co.	Russ Bldg., San Francisco	Castella
Antone Orsini	1409 Olive St., Redding	
Hugh Winchester	12602 S. San Pedro St., Los Angeles	Platina

Siskiyou County		
Dunsmuir Chrome Co., L. D. Taylor	711 Florence Ave., Dunsmuir	Dunsmuir
Hyden, Thompson, & Hyden	Callahan	Callahan
Fairview Chrome Mine, H. E. Ellickson	640 Lane St., Yreka	Hamburg
Kangaroo Mt. Chrome Mining Co., Phil Davies	526 California St., San Francisco	Seiad Valley
Lambert Chrome Mine, Basil Wild	Box 66, Fort Jones	Fort Jones
Tehama County		
McLaughlin & Applegarth	3001 Russ Bldg., San Francisco	Red Bluff
Tedoc & Red Mtn. Chrome Mines, Harry T. Moore	Platina	Platina
Trinity County		
Shasta Lilly Claim, Philip Munko	Castella	Castella
Tuolumne County		
W. L. Allen	122 S. Stanislaus St., Stockton	Jamestown
McCormick Chrome Mine, E. A. Kent	Jamestown	Jamestown

CLAY

(Including producers of crude clay; and manufacturers of brick, tile, porcelain, etc.)

Operator	Remarks	Address	Location of plant or pit
Alameda County			
California Faience Co.	a	1334 Hearst Ave., Berkeley	Berkeley
California Pottery Co.	a, c	Niles	Niles
N. Clark & Sons	a, b	401 Pacific Ave., Alameda	Alameda
Kraftile Co.	a, b, c	Niles	Niles
M & S Tile Co.	a, c	Decoto	Decoto
Merritt Supply Co.	a	1289 Cedar St., Berkeley	Berkeley
Amador County			
M. J. Bacon	c	Ione	Carbondale
Cal. Mineral Products Co., Ione Clay and Sand Pit	c, f	Kohl Bldg., San Francisco	Ione
N. Clark & Sons	c	401 Pacific Ave., Alameda	Ione
Clay Corp. of California	c	1275 Harrison St., San Francisco	Ione
Ione Fire Brick Co., J. T. Roberts, Mgr.	b, c	1267 Russ Bldg., San Francisco	Ione
Calaveras County			
California Pottery Co.	c	Niles	Valley Springs
Contra Costa County			
American Radiator & Standard Sanitary Mfg. Co., H. W. Creeger, Mgr.	a	Box W, Richmond	Richmond
Pacific Clay Products	c	Box 145, Sta. A, Los Angeles	
Port Costa Brick Works, C. G. Berg, Pres.	b	6th and Berry Sts., San Francisco	Port Costa
Stockton Fire Brick Co.	a, b	Russ Bldg., San Francisco	Pittsburg
Technical Porcelain & China Ware Co.	a	Manila and Kearney Sts., El Cerrito	El Cerrito
United Materials & Richmond Brick Co., Ltd.	a, b	Box 7, Richmond	Richmond
Humboldt County			
J. D. Thompson Brick Co.	a, b, c	R.F.D. 1, Box 20, Eureka	Eureka
Inyo County			
Muroc Clay Co.	e	5525 Randolph St., Maywood	Olancha
Kern County			
American Minerals Co.	c	5601 S. Boyle, Los Angeles	Cantil
Antelope Mud Co.	d	Box 496, Avenal	Rosamond
Bakersfield Rock Co.	d	Box 395, Sta. A, Bakersfield	Bakersfield
King Lumber Co.	b	Box 1559, Bakersfield	Bakersfield
McKittrick Mud Co., C. C. Sherpenburg	d	McKittrick	McKittrick
Mojave Corp.	d	Box 174, Los Nietos	Frazier Park
Muroc Clay Co.	e	5525 Randolph St., Maywood	Muroc

Los Angeles County			
American Container Co., Inc.	a	3132 E. Pico Blvd., Los Angeles	Los Angeles
Angulo Tile Co., L. R. H. and W. H. Angulo	a, c	Reseda, Los Angeles County	Reseda
B. W. Tile Co.	a	14600 S. Western Ave., Los Angeles	Los Angeles
J. A. Bauer Pottery Co.	a	415 W. Ave. 33, Los Angeles	Los Angeles
Builders Brick Co., Ltd.	b	17602 S. Western Ave., Moneta	Moneta and Compton
California Clay Research Co.	d	Box 316, Rosamond	Lancaster
Coast Brick Co.	b	Box 326, Moneta	Torrance
H. F. Coors Co., Inc.	a	Inglewood	Inglewood
Davidson Brick Co.	b	4701 Floral Dr., Los Angeles	Los Angeles
Eljer California Co.	a	4100 Alameda, Los Angeles	Arcadia
Emsco Refractories Co.	a, b	5601 S. Boyle Ave., Vernon	Vernon
General Refractories Co.	b	3363 Fruitland Road, Los Angeles	Los Angeles
Gladding, McBean & Co., Tropico, L. A. & S. M. Plants	a, b, c	2901 Los Feliz Blvd., Los Angeles	Tropico, Los Angeles, Santa Monica, Hermosa Beach and Vernon
Higgins Brick & Tile Works	a, b, c	Box 525, Moneta	Moneta
Italian Terra Cotta Co.	a	1149 Mission Rd. Los Angeles	Los Angeles
Pacific Clay Products	a, b, c	Box 145, Sta. A, Los Angeles	Los Angeles and Los Nietos
Pomona Brick Co., S. Bernard Strona	b	Pomona	Pomona
Pomona Tile Mfg. Co.	a	629 N. La Brea Ave., Los Angeles	Pomona
St. Louis Fire Brick & Insulation Co.	b	3050 E. Slauson St., Huntington Park	Huntington Park
Simons Brick Co., Walter R. Simons	a, b, c	1195 S. Boyle Ave., Los Angeles	Los Angeles
Star Brick Co.	b	Moneta	Moneta
Vernon Potteries	a	2300 E. 52d St., Los Angeles	Vernon
Vitrefrax Co.	a, b, c	5050 Pacific Blvd., Los Angeles	Los Angeles
Marin County			
McNear Brick Co.	a, c	McNear Point, San Rafael	McNear
Orange County			
El Toro Clay Co., I. P. Arnold	c, f	655 W. Second St., Los Angeles	El Toro
Gladding, McBean & Co.	c	2901 Los Feliz Blvd., Los Angeles	Gypsum
La Bolsa Tile Co.	a, c	R.F.D. 1, Box 174, Huntington Beach	Smeltzer
Mission Clay Products Co.	a, b, c	Olive	Olive
Tierra Colorado Clay Co.	c	Box 441, San Juan Capistrano	San Juan Capistrano
Placer County			
Clay Corp. of Calif.	c	1275 Harrison St., San Francisco	Lincoln
Gladding, McBean & Co.	a, b, c	2901 Los Feliz Blvd., Los Angeles	Lincoln
Lincoln Clay Products Co.	c	Lincoln	Lincoln
Riverside County			
Alberhill Coal & Clay Co.	c	Box 4267, Village St., Los Angeles	Alberhill
Los Angeles Brick Co.	a, b, c	1078 Mission Rd., Los Angeles	Alberhill
Pacific Clay Products	c	Box 145, Sta. A, Los Angeles	Corona
Temescal Clay Co.	c	8601 Dorothy Ave., South Gate	Temescal

a. Clay products. b. Brick and hollow building-tile. c. Crude clay. d. Oil-well drilling-mud. e. Filtering clay. f. Fire sand.

CLAY—Continued

(Including producers of crude clay; and manufacturers of brick, tile, porcelain, etc.)

Operator	Remarks	Address	Location of plant or pit
Sacramento County			
Cannon & Co.	a, b, c	Box 802, Sacramento	Ben Ali
H. C. Muddox, Jessie E. Muddox, Owner	a	30th and L Sts., Sacramento	Sacramento
Panama Pottery Co.	a	R.F.D. 4, Box 1478, 24th St. Rd., Sacramento	Sacramento
Sacramento Brick Co.	b	1300 Front St., Sacramento	Sacramento
San Bernardino County			
Baroid Sales Div., National Lead Co.	d, e	830 Ducommun St., Los Angeles	Hector
Hancock Brick Yard, C. P. Hancock & Son	b	Riverside	Highgrove
Kaiser Co., Inc.	c	P.O. Box 217, Fontana	Arcilla
Pacific Bentonite Mine, Louis Martinez	e	Box 374, Red Mountain	Red Mountain
Southern California Minerals Co., W. K. Skeoch	c	320 S. Mission Rd., Los Angeles	Goff
Temescal Clay Co.	g	6801 Dorothy Ave., South Gate	Hicks
San Diego County			
Pacific Clay Products Co.	c	Box 145, Station A, Los Angeles	Farr Station
Standard Oil Co. of Calif.	e	Standard Oil Bldg., San Francisco	Palm Siding
Union Brick Co., J. W. Rice	b	3565 3d St., North San Diego	Rose Canyon
San Joaquin County			
Pacific Clay Products Co.	a	Box 145, Station A, Los Angeles	Stockton
San Joaquin Brick Co.	b	33 S. El Dorado St., Stockton	Stockton
Stockton Brick & Tile Co.	a, b, c	McKinley Ave., Stockton	Stockton
San Luis Obispo County			
San Luis Brick Works, Faulstick Bros.	b	San Luis Obispo	San Luis Obispo
San Mateo County			
Richmond Potteries, Inc.	a	Box 187, South San Francisco	South San Francisco
Santa Barbara County			
McNall Building Materials	a, b, c	208 N. Salsipuedes, Santa Barbara	Santa Barbara
Santa Clara County			
Garden City Pottery	a	560 N. 6th St., San Jose	San Jose
Gladding Bros. Mfg. Co.	a, b, c	S. 3d and Keyes Sts., San Jose	San Jose
Myers Ceramic Pottery, F. Hinz	a	Box 97, Santa Clara	Santa Clara
Remillard-Dandini Co.	b	569 3d St., Oakland	San Jose
Solon & Larkin*	a	1881 S. 1st St., San Jose	San Jose
Stanislaus County			
Lester Raggio	c	Knights Ferry	Knights Ferry

Sutter County			
Gladding, McBean & Co.	c	2901 Los Feliz Blvd., Los Angeles	Nicolaus
Tulare County			
San Joaquin Materials Co.	b	744 G St., Fresno	Exeter
Ventura County			
Shell Oil Co., Dent Clay Pit	d	Shell Bldg., San Francisco	Ventura

a. Clay products. b. Brick and hollow building-tile. c. Crude clay. d. Oil-well drilling-mud. e. Filtering clay. f. Fire sand.
* Closed for duration.

COAL

Operator	Address	Location of mine
Trinity County		
Trinity Coal Co., Wm. A. Mumford	Weaverville	Douglas City

COPPER

Principal copper producers in California in 1943 (not less than 10,000 pounds)

Mine	Operator	Address	Postoffice of Mine
Amador County			
Newton	Winston Copper Co.	417 S. Hill St., Los Angeles 13	Jackson
Butte County			
Big Bend	Hoefling Bros.	1020 D St., Sacramento	Oroville
Calaveras County			
Keystone	Keystone Copper Corporation	Copperopolis	Copperopolis
Collier	Ernest A. Vogt	101 Palm Drive, Piedmont	Copperopolis
Quail Hill	G. Ivan Smith	Copperopolis	Copperopolis
El Dorado County			
Volo	Volo Mining Co.	Box 586, Placerville	----------
Inyo County			
Pine Creek	United States Vanadium Corporation	30 E. 42nd St., New York, N. Y.	Bishop
Darwin Group	Darwin Mines, Arthur J. Theis, Trustee	Darwin	Darwin
Last Chance	L. D. Foreman	850 South 4th West St., Salt Lake City, Utah	Keeler
Gold Bottom	Damon & Damon	Bin 14, Trona	Trona
Plumas County			
Pilot	J. W. Goodhue	Taylorsville	Taylorsville
San Bernardino County			
Bagdad-Chase	Frank Royer	Red Mountain	Ludlow
Shasta County			
Hornet (Mattie Orebody)	The Mountain Copper Co., Ltd.	216 Pine St., San Francisco	Matheson
Siskiyou County			
Gray Eagle	Gray Eagle Copper Co.	Happy Camp	Happy Camp

DIATOMITE (DIATOMACEOUS EARTH)

Operator	Address	Location of quarry or mine
Los Angeles County		
The Dicalite Co.	756 S. Broadway, Los Angeles	San Pedro
Santa Barbara County		
Johns-Manville Products Corp.	Lompoc	Lompoc
Lompoc Diatomite Co.	405 Montgomery St., San Francisco	Lompoc

DOLOMITE

Operator	Address	Location of quarry
Los Angeles County		
W. F. Glasser, Inc.	713 N. Sepulveda, Brentwood Heights, Los Angeles	Bel-Air
Monterey County		
Bethlehem Steel Co., Sterling Ranch Quarry	20th and Illinois, San Francisco	Natividad
Permanente Metals Corp.	Permanente	Natividad
San Benito County		
Archie E. Hamilton	Hollister	Hollister
Tuolumne County		
U. S. Lime Products Corp.*	85 2d St., San Francisco	Sonora

* Output partly used in lime.

FELDSPAR

Operator	Address	Location of mine
Fresno County		
W. H. Childer	Box 671, Fresno	Friant
San Bernardino County		
Gladding, McBean & Co.	2901 Los Feliz Blvd., Los Angeles	

GEMS AND JEWELERS' MATERIALS

Operator	Variety	Address
Calcite Operators	Iceland Spar	Thermal
C. M. Carter	Topaz	553 27th St., Oakland
Green Mtn. Mine	Quartz Crystals	Mokelumne Hill
H. F. Heather	Bloodstone	236 S. Oak Knoll Ave., Pasadena
P. S. Litt	Quartz Crystals	127 Anglus, Turlock
Rough Diamond Mining Co., E. C. Setzer	Quartz Crystals	1422 Mission St., Pasadena

Principal gold producers in California out of a total of placer operators and lode mines in 1943. (Not less than 200 ounces.)

Mine	Type of mine	Operator	Address	Postoffice of mine
Amador County				
Plymouth Tails	c	Argonaut Mining Co., Ltd.	Jackson	Plymouth
Butte County				
Feather River Channel	h	Golden Feather Dredging Co.	Rt. 2, Oroville	Oroville
Oroville Dredge	e	Oroville Gold Dredging Co.	2052 Bird St., Oroville	Oroville
Calaveras County				
Carson Hill	a	Carson Hill Gold Mining Co.	Melones	Melones
Collier	s	Ernest A. Vogt	101 Palm Drive, Piedmont	Copperopolis
Quail Hill	s	G. Ivan Smith	Copperopolis	Copperopolis
Inyo County				
Darwin Group	m	Darwin Mines, Arthur J. Theis, Trustee	Darwin	Darwin
Columbia No. 2	m	Shoshone Mines, Inc.	Tecopa	Tecopa
Gold Bottom	b and s	Damon & Damon	Bin 14, Trona	Trona
Kern County				
Tungold	e	Rand Gold Dredging Associates	235 Montgomery St., San Francisco	Randsburg
Cactus Queen	a	Cactus Mines Co.	523 W. 6th St., Los Angeles	Rosemond
Big Butte	a	Butte Lode Mining Co.	650 S. Grand Ave., Los Angeles	Randsburg
Mariposa County				
Feliciana	a	Russell D. Wilson	Garden Valley	Midpines
Mount Gaines	a	Mount Gaines Mining Co.	Hornitos	Hornitos
Pine Tree & Josephine	a	Pacific Mining Co.	1022 Crocker Bldg., San Francisco	Bear Valley
Nevada County				
Relief Hill	g	Western Gold, Inc.	942 Russ Bldg., San Francisco	North Bloomfield
Empire, North Star et al.	a	Empire Star Mines Co., Ltd.	Box 1027, Grass Valley	Grass Valley
Lava Cap	a	Lava Cap Gold Mining Corp.	Box 780, Nevada City	Nevada City
Placer County				
Oro Fino	a	Oro Fino Consolidated Mines	Box 432, Auburn	Auburn
Sacramento County				
Fair Oaks	k	Pacific Coast Aggregates, Inc. and Fair Oaks Gravel Co.	Sacramento	Fair Oaks
Natomas	e	Natomas Co.	Forum Bldg., Sacramento	Natoma

a. Lode gold mine. b. Gold-silver mine. c. Tailings dumps. d. Pocket. e. Dredge (bucket line). f. Drift mine. g. Hydraulic mine. h. Dragline operations. j. Copper-gold mine. k. Power shovel or dryland dredge. m. Lead mine. n. Suction dredge.

GOLD—Continued

Principal gold producers in California out of a total of placer operators and lode mines in 1943. (Not less than 200 ounces.)

Mine	Type of mine	Operator	Address	Postoffice of mine
San Bernardino County				
Spud Patch	k	Hoefling Bros.	Box 768, Sacramento	Atolia
Bagdad-Chase	a	Frank Royer	Red Mountain	Ludlow
San Joaquin County				
Lower Comanche Dredge Upper Comanche Dredge	e	Gold Hill Dredging Co.	311 California St., San Francisco	Camanche
Shasta County				
Kutras Tract	k	Columbia Construction Co., Inc.	Box 579, Redding	Redding
Hornet (Mattie Orebody)	j	The Mountain Copper Co., Ltd.	216 Pine St., San Francisco	Matheson
Sierra County				
Ruby	f	C. L. Best	800 Davis St., San Leandro	Downieville
Original 16 to 1	a	Original Sixteen to One Mine, Inc.	1611 Russ Bldg., San Francisco	Alleghany
Brush Creek	a	Alpha Hardware & Supply Co.	Nevada City	Goodyears Bar
Siskiyou County				
Gray Eagle	j	Gray Eagle Copper Co.	Happy Camp	Happy Camp
Stanislaus County				
Placer Properties	h	Placer Properties Co.	Box 532, Oakdale	Oakdale
Tuolumne Gold Dredge	e	Tuolumne Gold Dredging Corp.	1 Montgomery St., San Francisco	La Grange
Trinity County				
Red Hill	f	Goldfield Consolidated Mines Co.	1 Montgomery St., San Francisco	Junction City
Tuolumne County				
Eagle-Shawmut	a	Miller & Clemson	4800 Santa Fe Ave., Los Angeles	Chinese Camp
Yuba County				
Leary	e	Williams Bar Dredging Co.	232 Montgomery St., San Francisco	Marysville
Yuba Unit	e	Yuba Consolidated Gold Fields	351 California St., San Francisco	Hammonton

a. Lode gold mine. b. Gold-silver mine. c. Tailings dumps. d. Pocket. e. Dredge (bucket line). f. Drift mine. g. Hydraulic mine. h. Dragline operations. j. Copper-gold mine. k. Power shovel or dryland dredge. m. Lead mine. n. Suction dredge.

GRANITE

Operator	Product	Address	Location of quarry
Fresno County			
Superior-Academy Granite Co.	a	Clovis	Academy
Lassen County			
Greig Quarry, A. D. Greig	a	Susanville	Susanville
Placer County			
Union Granite Co., Ruhkala Bros.	a	Rocklin	Rocklin
Victor Wickman	a	Rocklin	Rocklin
Riverside County			
Emil Johnson	a	Perris	Perris
Sacramento County			
Folsom State Prison	a, e	Represa	Represa
San Bernardino County			
Texas Quarries, Inc., R. M. Richter	a	Box 605, Victorville	Victorville
San Diego County			
Crystal Black Quarry, John Stridsburg	a	Escondido	Spooks Canyon
Pacific Cut Stone & Granite Co.	--	414 S. Marengo Ave., Alhambra	Escondido
Sonoma County			
S. Cabrol	b, c	Glen Ellen	Glen Ellen

a. Granite used in building and monumental stone. b. Tuff used as building stone. c. Volcanic rock used as flagstone and building stone. d. Mica schist used as building stone. e. Paving blocks.

GYPSUM

Operator	Address	Location of quarry
Alameda County		
Westvaco Chlorine Prod. Corp.*	Newark	Newark
Imperial County		
Imperial Gypsum Quarry, Pacific Portland Cement	417 Montgomery St., San Francisco	Plaster City
Kern County		
Handel & Son	Shafter	Lost Hills
H. M. Holloway	Box 310, Lost Hills	Lost Hills
Star Gypsum Co.	P.O. Box 204, Lost Hills	Lost Hills
Theta Gypsum Co.	Lost Hills	Lost Hills
Valley Agricultural Gypsum Co.	Box 186, Shafter	Belridge
Riverside County		
U. S. Gypsum Co.	507 Architects Bldg., Los Angeles	Midland
Ventura County		
Monolith Portland Cement Co.	Bartlett Bldg., Los Angeles	Cuyana Valley

* Output not included in production figures as gypsum is by-product of chemical process using minerals already included in State total.

IODINE

Operator	Address	Mine
Los Angeles County		
Deepwater Chemical Co., Ltd.	Box 588, Compton	Compton
The Dow Chemical Co.	Midland, Mich.	Long Beach and Venice

IRON

Operator	Address	Location of mine
San Bernardino County		
Altuda Mining Co.	725 S. Fremont Ave., Alhambra	Hodge
Kaiser Co., Inc., Iron and Steel Division	515 Latham Square Bldg., Oakland	Kelso
Minerals Material Co.	1145 Westminster Ave., Alhambra	Baxter
The Donald Kanneth Co.	116 Montgomery St., San Francisco	Yermo
Santa Cruz County		
Santa Cruz-Nevada Co.	552 Berry St., San Francisco	Aptos
Shasta County		
Shasta Iron, Carrico & Bautier	365 Ocean Ave., San Francisco	Heroult

LEAD

Principal lead producers in California in 1943. (Not less than 10,000 pounds.)

Mine	Operator	Address	Postoffice of mine
Butte County			
Big Bend	Hoefling Bros.	1820 D St., Sacramento	Oroville
Calaveras County			
Collier	Ernest A. Vogt	101 Palm Drive, Piedmont	Copperopolis
Quail Hill	G. Ivan Smith	Copperopolis	Copperopolis
Inyo County			
Cerro Gordo	L. D. Foreman	850 South 4th West St., Salt Lake City, Utah	Keeler
Leary	Desert Miners	Darwin	Darwin
Darwin group	Darwin Mines, Arthur J. Theis, Trustee	Darwin	Darwin
Lane	L. D. Foreman	850 South 4th West St., Salt Lake City, Utah	Keeler
Last Chance			
Montezuma	Eugene Craft	Box 764, Big Pine	Big Pine
Colorado	E. H. Snyder	Keeler	Keeler
Defence	C. C. King	Keeler	Keeler
Columbia No. 2	Shoshone Mines Inc.	Tecopa	Tecopa
	A. G. Scott	Shoshone	Shoshone
Gold Bottom	Damon & Damon	Bin 14, Trona	Trona
Honolulu-Big Horn	Southwest Lead & Zinc Co.	433 S. Spring St., Los Angeles 13	Trona
Lead King	George Lippincott	Box 1811, Santa Ana	Trona
Ophir	C. O. Mittendorf	Trona	Trona
Nevada County			
Lava Cap	Lava Cap Gold Mining Corp.	Box 780, Nevada City	Nevada City
San Bernardino County			
Ord	Symons Bros. Screen Co.	Barstow	Barstow
	Huckleberry & Dawson	Wheaton Springs	Wheaton Springs
Sagamore	California Sulphur Co.	1427 E. 4th St., Los Angeles	Ivanpah

Operator	Product	Address	Location of quarry
Alameda County			
Westvaco Chlorine Prod. Corp.	a, d	Newark	Newark
El Dorado County			
Diamond Springs Lime Co.	a, b, c	Diamond Springs	Diamond Springs
El Dorado Limestone Co., J. H. Bell, Pres.	b	Shingle Springs	Shingle Springs
Inyo County			
Blue Star Mines, Ltd.	b	Room 510, 810 S. Spring St., Los Angeles	Zurich
Los Angeles County			
W. F. Glasser, Inc.	b	713 N. Sepulveda, Brentwood Heights, Los Angeles	Bel-Air
Riverside County			
Howard Small	b, c	311 Main St., Riverside	Riverside
San Bernardino County			
Cal. Portland Cement Co.	a, b	601 W. 5th St., Los Angeles	Colton
Chubbuck Lime Co., Chas. I. Chubbuck	a, b, c	5000 Worth St., Los Angeles	Chubbuck
Mill Creek Limestone Co.	b	6009 Santa Monica Blvd., Los Angeles	
Victorville Lime Rock Co.	b	5225 Wilshire Blvd., Los Angeles	Victorville
San Mateo County			
Pacific Portland Cement Co.	c, d	417 Montgomery St., San Francisco	Redwood City
Santa Clara County			
Bay Shell co.	c, d	503 Market St., San Francisco	Alviso
Beck Dredging Co.	c, d	305 Parrott Dr., San Mateo	Alviso
Permanente Cement Co.	b	Permanente	Permanente
Santa Cruz County			
Henry Cowell Lime and Cement Co.	a, b	2 Market St., San Francisco	Santa Cruz
Pacific Limestone Prod. Co.	b, c	Spring St., Santa Cruz	Santa Cruz
Santa Cruz Portland Cement Co.	b	Crocker Bldg., San Francisco	Davenport
Tuolumne County			
U. S. Lime Products Corp.	a, b	58 Sutter St., San Francisco	Sonora
Ventura County			
Western Lime Products Co.	b, c	6305 Yucca St., Los Angeles	Santa Susana

a. Producer of burnt lime. b. Producer of limestone. c. Agricultural lime. d. Shells.

LITHIA

Operator	Address	Location of mine
American Potash & Chemical Corp.	Trona	Trona

MAGNESITE

Operator	Address	Location of mine
Alameda County		
Westvaco Chlorine Prod. Corp.*	405 Lexington Ave., New York, N. Y.	Newark
Monterey County		
The Permanente Metals Corp.	Permanente	Moss Landing
Santa Clara County		
Westvaco Chlorine Prod. Corp., Lessee, Western Magnesite Mine	405 Lexington Ave., New York, N. Y.	Red Mountain
Stanislaus County		
Westvaco Chlorine Prod. Corp., Lessee, Bald Eagle Mine	405 Lexington Ave., New York, N. Y.	Gustine

* Magnesium oxide reduced from sea water and used as magnesite.

MAGNESIUM SALTS

Operator	Product	Address	Location of plant
Alameda County			
Westvaco Chlorine Prod. Corp.	Hydroxide	405 Lexington Ave., New York, N. Y.	Newark
Monterey County			
The Permanente Metals Corp.	Oxide	Permanente	Moss Landing
San Diego County			
Westvaco Chlorine Prod. Corp.	Chloride	405 Lexington Ave., New York, N. Y.	San Diego
San Mateo County			
Marine Magneisum Prod. Corp., R. E. Clarke	Carbonate hydroxide and oxide	South San Francisco	South San Francisco
Plant Rubber & Asbestos Works	Carbonate	537 Brannan St., San Francisco	Redwood City

MANGANESE ORE

Principal producers out of 58 operating properties

Operator	Address	Location of mine
Amador County		
Garibaldi Bros.	Volcano	Volcano
Joseph T. Stacy	Pine Grove	Pine Grove
Crabtree & Sullivan	Jackson	Jackson
Humboldt County		
The Crossman Co.	Alderpoint	Alderpoint
R. F. Helmke	Garberville	Alderpoint
Imperial County		
Whedon Manganese Mines, V. B. Whedon	511 N. Roxbury Dr., Beverly Hills	Glamis
Lake County		
T. L. Young	320 Market St., San Francisco	Gravelly Valley
Marin County		
L. R. Knutte	Nave Bldg., Novato	Novato
Mendocino County		
R. F. Helmke	Garberville	Alderpoint
Plumas County		
Western Manganese Mine, O. H. Griggs	Crescent Mill	Crescent Mill
Riverside County		
Arlington Group, A. B. Miner	11143 Washington Blvd., Culver City	Inca
San Bernardino County		
Kern Leasing Co., Howard W. Orwig	1079½ Leighton Ave., Los Angeles	Barstow
K. & S. Mining Co.	Mannix	Mannix
W. Earl Thurber	116 N. Madison Ave., Monrovia	Pisgah
San Joaquin County		
Johnson Manganese Mining Co.	1007 Merchants Exchange Bldg., San Francisco	Vernalis
Phil Winegar	Box 246, Vernalis	Vernalis
San Luis Obispo County		
A. T. Adams, Irish Hill Manganese Mine	Box 95, San Luis Obispo	San Luis Obispo

Santa Clara County		
Black Oak & Matt Mine, Barker Corp.	Box 696, Patterson	Patterson
Pine Ridge Manganese Mine, Alfred J. Jackson	Morgan Hill	Madrone
Sonoma County		
Aho Mine, Humphreys Gold Corp.	910 First National Bank Bldg., Denver, Colo.	Cazadero
Stanislaus County		
Buckeye Mine, Verner Allen	150 Montgomery St., San Francisco	Vernalis
Tip Top Mine, M. A. Wright	Box 237, Patterson	Patterson
Western Manganese Co.	519 California St., San Francisco	Patterson
J. P. Warren	605 Market St., San Francisco	Patterson
Trinity County		
Ray F. Helmke	Garberville	Alderpoint
Manganese Queen Mine, A. Gronzotto	Box 224, Walnut Creek	Forest Glen
McKnight Group, James I. Scott & Co.	P.O. Box 624, Fortuna	Ruth
J. M. McKnight	Ruth	Ruth

MINERAL PAINT

Operator	Address	Location of property
Stanislaus County		
Lester Raggio	Knights Ferry	Knights Ferry

MINERAL WATER

Operator	Address	Location of spring
Butte County		
Richardson Mineral Springs, Lee Richardson, Mgr.	Richardson Springs	Richardson Springs
Contra Costa County		
Alhambra Water Co.	Martinez	Martinez
Fox Water Co.	675 37th St., Oakland	Oak Springs
Lake County		
Adams Mineral Springs, Clarence Prather	Adams, via Middletown	Adams
Bartlett Springs Co.	Bartlett Springs, via Williams	Bartlett Springs
Howard Hot Springs, J. P. Francisco	Middletown	Middletown
Norman Mineral Springs, H. C. Norman, Mgr.	Middletown	Middletown
Witter Medical Springs, W. E. Whitaker	1265 4th Ave., San Francisco	Witter Springs
Los Angeles County		
Deep Rock Artesian Water	4416 York Blvd., Los Angeles	Los Angeles
Elysian Spring Water Co.	1536 Baxter, Los Angeles	Los Angeles
Frespuro Artesian Water	4430 York Blvd., Los Angeles	Los Angeles
Holly Spring Water	2298 Holly Dr., Los Angeles	Los Angeles
Indian Head Mineral Water	3640 N. Griffin Ave., Los Angeles	Los Angeles
Magnetic Spring Water Co.	936 Palm Ave., Sherman	Los Angeles
Mountain Spring Water Co.	226 S. Avenue 54, Los Angeles	Los Angeles
Sparklett Bottled Water Corp.	4500 York Blvd., Los Angeles	Los Angeles
Marin County		
Purity Spring Water Co.	2032 Kearny St., San Francisco	----------
Napa County		
Calistoga Bottling Works, Ernest Mainini	Calistoga	Calistoga
Napa Soda Springs Co., G. H. T. Jackson	315 Montgomery St., San Francisco	Napa
Napa Vichy Springs, V. Frugoli	146 11th St., San Francisco	Napa
Samuels Soda Springs, T. B. Grigsby	Monticello	Monticello
Orange County		
La Vida Mineral Springs Co.	Route 1, Placentia	Carbon Canyon
Placer County		
Kilaga Water Co.	Lincoln	Valley
Riverside County		
Beulah Springs, Oscar C. McNicholl	Arlington	Arlington

San Bernardino County		
Arrowhead & Puritas Waters, Inc.	1566 E. Washington Blvd., Los Angeles	Arrowhead
San Diego County		
Rock Springs Co., L. H. Walck	Route 2, Box 224-A, Escondido	Escondido
San Luis Obispo		
New Crystal Spring Water Co., Ellen M. Hudson	Route 2, Box 129, San Luis Obispo	San Luis Obispo
Santa Barbara County		
Veronica Mineral Springs Co.	699 Brannan St., San Francisco	Santa Barbara
Shasta County		
Hilltop Spring Water Co.	Redding	Shasta
Siskiyou County		
Coca Cola Bottling Co., Fred J. Meamber, Prop.	Yreka	Little Shasta
The Shasta Water Co.	6th and Brannan Sts., San Francisco	Dunsmuir
Sonoma County		
Agua Caliente Springs Co., T. H. Corcoran, Prop.	Agua Caliente	Agua Caliente
Barcal Springs, John Kolling	Cloverdale	Cloverdale
Boyes Springs Mineral Water Co.	Boyes Springs	Boyes Springs
Fetters Mineral Springs, George Fetters	Fetters Springs	Fetters Springs

MOLYBDENUM ORE

Mine	Operator	Address	Location of mine
Pine Creek Mine	United States Vanadium Corp.	Bishop	Bishop

POTASH

Operator	Address	Location of plant
San Bernardino County		
American Potash and Chemical Co.	Trona	Trona

PUMICE OR VOLCANIC ASH

Operator	Product	Address	Location of property
Inyo County			
American Pumice Co.	a	4031 Goodwin Ave., Los Angeles	Little Lake
Pacific Coast Pumice Co., C. W. Churchill	a	P.O. Box 656, Bishop	Bishop
Kern County			
Calsilico Corp., G. A. Reynolds	b	445 S. Amalia Ave., Los Angeles	Cantil
Cudahy Packing Co.	b	803 Macy St., Los Angeles	Ceneda
Madera County			
Calif. Industrial Minerals, c/o Forrest S. Taylor	b	Friant	Friant
Pacific Pumice Materials Co., W. E. Schlink	a	1047 N. Hunter St., Stockton	Friant
Modoc County			
Glass Mt. Volcolite Co., H. W. Free	b, c	Tionesta	Tionesta
Mono County			
Alexander Jamieson	d	Box 704, Big Pine	Big Pine
Napa County			
Basalt Rock Co.	a	8th St., Napa	Monticello
San Luis Obispo County			
Red Eagle Mine, M. L. Francis	b	Creston	Creston

a. Pumice, aggregate. b. Volcanic ash. c. Scoria. d. Pumice for scouring brick.

PYRITE

Operator	Address	Location of mine
Shasta County		
Mountain Copper Co., Wm. F. Kett, Mgr.	216 Pine St., San Francisco	Matheson

QUICKSILVER

Principal Producers in California for 1943 out of a total of 86 operating properties

Mine	Operator	Address	Location of mine
Colusa County			
Wide Awake	General Mercury Co.	Natoma	Wilbur Springs
Contra Costa County			
Mt. Diablo	Bradley Mining Co.	Crocker Bldg., San Francisco	Clayton
Del Norte County			
Patrick's Creek	Burton B. Avery	Sutherland, Ore.	Patrick's Creek
Inyo County			
Atlas	Atlas Development Co.	Little Lake	Little Lake
Coso	King Mining Co., Lloyd King	Little Lake	Little Lake
Lake County			
Abbott	International Metals Dev. Inc., C. O. Reed, Mgr.	Williams	Wilbur Springs
Great Western	Bradley Mining Co.	Crocker Bldg., San Francisco	Middletown
Mirabel	Mirabel Quicksilver Co.	Middletown	Middletown
Sulphur Bank	Bradley Mining Co.	Crocker Bldg., San Francisco	Clearlake Park
Napa County			
Aetna	Basin Montana Tunnel Co., Conrad Martin, Sup't	Aetna Springs	Aetna Springs
Corona	T. J. Flinn	373 Parrot Dr., San Mateo	Aetna Springs
Corona & Twin Peaks	Twin Peaks Mining Co.	315 Montgomery St., San Francisco	Aetna Springs
Eureka	A. Garcia	Box 513, Middletown	Pope Valley
James Creek	J. L. Stockton	Pope Valley	Pope Valley
Knoxville	Geo. E. Gamble	1431 Waverly St., Palo Alto	Monticello
Manhattan Mine	Chas. Wilson & W. M. Hickox	Monticello	Monticello
Oat Hill	H. W. Gould & Co.	Penthouse, Mills Bldg., San Francisco	Aetna Springs
Oat Hill Extension	Zack Anderson	Middletown	Aetna Springs
San Benito County			
Aurora	Paul Wingert	Idria	Idria
Lea-Grant	Sam Cohn	Panoche	Panoche
Lea-Grant	Marsman Co. of California	Russ Bldg., San Francisco	Panoche
New Idria	New Idria Quicksilver Mining Co.	Mills Bldg., San Francisco	Idria
Panoche	Panoche Quicksilver Mining Co., P. D. Burtt	1078 Mills Bldg., San Francisco	Llanada
Pico Rico	George Valdez	Panoche	Panoche
Stayton Quicksilver	R. B. Knox	Hollister	Hollister
Tirado	Jose Tirado	Hernandez	Hernandez

QUICKSILVER—Continued

Principal Producers in California for 1943 out of a total of 86 operating properties.

Mine	Operator	Address	Location of mine
San Luis Obispo County			
Buena Vista	A. R. McCartney	Salinas	Paso Robles
Buckeye	Oscar E. Hanno	Box 242, Cambria	Cambria
Klau	H. W. Gould & Co.	Mills Bldg., San Francisco	Adelaide
Oceanic	American Quicksilver Co.	care Phil Jacobson, 501 6th St., Los Angeles	Cambria
Polar Star	Polar Star Quicksilver Mine, L. K. Requa	411 Felt Bldg., Salt Lake City, Utah	San Simeon
Santa Barbara County			
Los Prietos	Falcon Mercury Co.	Box 117, Santa Barbara	Santa Barbara
Red Rock	Cachuma Mining Co., L. W. Wickes	1206 Pac. Mutual Bldg., Los Angeles	Solvang
Santa Clara County			
Guadalupe	Laco Mining Co., H. N. Mason	Rt. 3, Box 412, Los Gatos	Los Gatos
Half Dome	Joseph A. Conner & Stephen Torreck	1777 Lafayette St., Santa Clara	
Hunt & Grunt	Frank B. Pfeiffer	Almaden	Almaden
New Almaden	New Almaden Corp., C. N. Schuette, Gen. Mgr.	Call Bldg., San Francisco	Almaden
New Almaden Dump	Dave & Ben Black (owners)	Rt. 3, Box 314, Los Gatos	Almaden
Silver Creek	Sam Cohn	Rt. 4, Box 345, San Jose	San Jose
Siskiyou County			
Great Northern	Empire Canyon Quicksilver Mines	Box 488, Yreka	Hornbrook
Sonoma County			
Cloverdale	Metal Mining Exploration Co.	Russ Bldg., San Francisco	Cloverdale
Culver Baer	C. A. Baumeister	Cloverdale	Cloverdale
Eagle Rock	Frank A. Dewey	Cloverdale	Cloverdale
Great Eastern	Magee Mercury, Inc.	69 Sutter St., San Francisco	Guerneville
Mt. Jackson	Sonoma Quicksilver Mines, Inc.	58 Sutter St., San Francisco	Guerneville
Skaggs Springs	E. J. Bumsted	Geyserville	Skaggs Springs
Socrates	Contact Quicksilver Co.	1924 Broadway, Oakland	Pine Flat
Trinity County			
Altoona	Marsman Co. of California	Russ Bldg., San Francisco	Castella
Yolo County			
Harrison	Yo-Lake Mineral Co.	Lower Lake	Rumsey
Reed	Bradley Mining Co.	Crocker Bldg., San Francisco	Rumsey

NOTE: Many of the above properties are now closed down and the addresses are those of the operator in 1943.

SALT

Operator	Address	Location of plant
Alameda County		
American Salt Co., Mrs. Mary Marsicano	341 Broadway, San Francisco	Mt. Eden
Leslie Salt Co.	310 Sansome St., San Francisco	Newark and Mt. Eden
Oliver Bros. Salt Co.	Mt. Eden	Mt. Eden
Inyo County		
Mineral Materials Co., J. W. Dunton, Mgr.	1145 Westminster Ave., Alhambra	Badwater
Los Angeles County		
Long Beach Salt Co.	P.O. Box 28, Long Beach	Long Beach
Monterey County		
Monterey Bay Salt Works, E. C. Vierra, Mgr.	Moss Landing	Moss Landing
Orange County		
The Irvine Co.	Tustin	Tustin
San Bernardino County		
California Rock-Salt Co.	2465 Hunter St., Los Angeles	Amboy
Desert Chemical Co.	4031 Goodwin Ave., Los Angeles	Amboy
San Diego County		
Western Salt Co.	1245 National Ave., San Diego	San Diego

SANDSTONE

Operator	Address	Location of quarry
Monterey County		
Carmel Stone Quarry, A. L. Possadori	Box 185, Carmel	Carmel
Andrew Stewart	Carmel Valley	Carmel

SILICA

Operator	Product	Address	Location of mine
Contra Costa County			
Hazel-Atlas Glass Co. of California, Ltd.	b	87th and G Sts., Oakland	Summerville
Mariposa County			
The Permanente Metals Corp.	a	Latham Square Bldg., Oakland	La Grande
Monterey County			
Owens-Illinois Glass Co.	b	135 Stockton St., San Francisco	Del Monte
Orange County			
Arnold Clay Mine, I. P. Arnold	b	655 W. 2d St., Downey	El Toro
Riverside County			
P. J. Weisel, Inc.	b	La Habra	Corona
San Bernardino County			
Gladding, McBean & Co.	a	2901 Los Feliz Blvd., Los Angeles	
Mineral Materials Co., C. W. Dunton, Mgr.	a	1145 Westminster Ave., Alhambra	
Temescal Clay Co.	c	8601 Dorothy Ave., South Gate	Victorville
Stanislaus County			
P. S. Litt	a	127 Anglus, Turlock	Del Porte Canyon

a. Quartz. b. Glass sand. c. Quartzite.

SILLIMANITE-ANDALUSITE-CYANITE GROUP

Operator	Product	Address	Location of mine
Imperial County			
Vitrefrax Co.	Cyanite	5050 Pacific St., Vernon, Los Angeles	Ogilby
Mono County			
Champion Sillimanite, Inc.	Andalusite	Box 117, Laws	Mocalno

Principal silver producers in California in 1943. (Not less than 2,000 ounces)

Mine	Type of mine	Operator	Address	Postoffice of mine
Butte County				
Big Bend	s	Hoefling Bros.	1820 D St., Sacramento	Oroville
Calaveras County				
Keystone	j	Keystone Copper Corp.	Copperopolis	Copperopolis
Collier	s	Ernest A. Vogt	101 Palm Drive, Piedmont	Copperopolis
Quail Hill	s	G. Ivan Smith	Copperopolis	Copperopolis
Inyo County				
Pine Creek	r	United States Vanadium Corp.	30 E. 42d St., New York, N. Y.	Bishop
Darwin group	m	Darwin Mines, Arthur J. Theis, Trustee	Darwin	Darwin
Last Chance	m	L. D. Foreman	850 South 4th West St., Salt Lake City, Utah	Keeler
Columbia No. 2	m	Shoshone Mines, Inc.	Tecopa	Tecopa
Gold Bottom	b and s	Damon & Damon	Bin 14, Trona	Trona
Honolulu-Big Horn	t	Southwest Lead and Zinc Co.	433 S. Spring St., Los Angeles 13	Trona
Kern County				
Cactus Queen	a	Cactus Mines Co.	523 W. 6th St., Los Angeles	Rosemond
Nevada County				
Empire, North Star et al.	a	Empire Star Mines Co., Ltd.	Box 1027, Grass Valley	Grass Valley
Lava Cap	a	Lava Cap Gold Mining Corp.	Box 780, Nevada City	Nevada City
San Bernardino County				
Bagdad-Chase	a	Frank Royer	Red Mountain	Ludlow
Shasta County				
Hornet (Mattie Orebody)	j	The Mountain Copper Co., Ltd.	216 Pine St., San Francisco	Matheson
Siskiyou County				
Gray Eagle	j	Gray Eagle Copper Co.	Happy Camp	Happy Camp
Tuolumne County				
Eagle-Shawmut	a	Miller & Clemson	4800 Santa Fe Ave., Los Angeles	Chinese Camp

a. Lode gold mine. b. Gold-silver mine. j. Copper-gold mine. m. Lead mine. r. Tungsten mine. s. Zinc.

SLATE

Operator	Product	Address	Location of quarry
El Dorado County			
Pacific Minerals Co., Ltd.	b, c	337 10th St., Richmond	Chili Bar

b. Granules. c. Flagging.

SOAPSTONE AND TALC

Operator	Product	Address	Location of mine
Amador County			
C. C. Harker	a	Box 594, Jackson	Jackson
El Dorado County			
Pacific Minerals Co., Ltd., Chas. S. Renwick, Jr.	a	337 10th St., Richmond	Shrub
Inyo County			
Blue Star Mines, Ltd.	b	810 S. Spring St., Los Angeles	Kingston Mountain
Death Valley Talc Co.	b	806 Trans America Bldg., Los Angeles	Furnace Creek
Muroc Clay Co.	b	5525 Randolph St., Maywood	Shoshone
Palmer Development Co.	b	Box 301, Lone Pine	Lone Pine
Sierra Talc Co., Franklin Booth, Mgr.	b	428 Union League Bldg., Los Angeles	Keeler
White Mountain Talc Co., Wm. M. Bonham	b	Lone Pine	Lone Pine
San Bernardino County			
Monarch Talc Mines	b	649 S. Olive St., Los Angeles	Shoshone
Sierra Talc Co.	b	500 Union League Bldg., Los Angeles	Silver Lake
Southern Calif. Minerals Co., W. S. Skeoch	b	320 Mission Rd., Los Angeles	Kingston Mountain
Western Talc Co.	b	1901 E. Slauson Ave., Los Angeles	Death Valley

a. Soapstone. b. Talc.

SODA

Operator	Product	Address	Location of plant
Inyo County			
Natural Soda Products Co.	a, d	405 Montgomery St., San Francisco	Keeler
Pacific Alkali Co.	a, d	523 W. 6th St., Los Angeles	Bartlett
San Bernardino County			
American Potash & Chemical Co.	a, c	Trona	Trona
Desert Chemical Co.	c	4031 Goodwin Ave., Los Angeles	Amboy
West End Chemical Co.	a	Latham Square Bldg., Oakland	West End

a. Soda ash. c. Salt cake. d. Trona.

STONE, MISCELLANEOUS

Under the heading of 'miscellaneous stone' there are four divisions—crushed rock, grinding mill pebbles, paving blocks, and sand and gravel. Crushed rock includes crushed rock that is used in macadam, ballast and for concrete; also rock used for rubble and riprap.

NOTE.—The California State Highway Commission, the various counties, U. S. Forest Service and U. S. Bureau of Public Roads produce both crushed rock and sand and gravel in various places in the State used in construction and maintenance of highways, but not specified in this listing.

Operator	Product	Address	Location of pit or quarry
Alameda County			
California Rock & Gravel Co.	a	1800 Hobart Bldg., San Francisco	Livermore
J. Catucci	b	1212 18th Ave., Oakland	Oakland
Heafey-Moore Co., Leona Quarry	b	344 High St., Oakland	Oakland
Henry J. Kaiser Co.	a, b	1522 Latham Square Bldg., Oakland	Radum
Kemper Bros.	b	5998 Strabridge Ave., Hayward	Hayward
Leslie Salt Co.	b	310 Sansome St., San Francisco	Newark
Pacific Coast Aggregates, Inc.	a, b	85 2d St., San Francisco	Eliot and Niles
Thos. B. Russell Quarry, T. B. Russell	b	1192 Russell Way, Hayward	Hayward
San Leandro Rock Co., Lake Chabot Quarry	b	2485 Washington St., San Leandro	Lake Chabot
Superior Rock Co.	b	Broadway and McAdams St., Oakland	Oakland
Amador County			
Charles Ayers	a	P.O. Box 266, Sutter Creek	Jackson
Butte County			
Bechtel-Kaiser Rock Co., R. J. Kennedy, Mgr.	a, b	1522 Latham Square Bldg., Oakland	
Pacific Coast Aggregates, Inc.	a, b	85 2d St., San Francisco	Oroville
Calaveras County			
Neilsen Gravel Plant, Att'n R. Neilsen	a	Box 14, San Andreas	San Andreas
Contra Costa County			
Antioch Asphalt Co.	a	Claremont Hotel, Berkeley	Antioch
Basalt Rock Co.	a	8th St., Napa	Antioch
Blake Bros., Anson Blake	b	Box 1002, Richmond	Point Richmond
Henry J. Kaiser Co.	a, b	1522 Latham Square Bldg., Oakland	Antioch and Upton
Stege Quarry, H & B Rock Co.	b	Box 126, El Cerrito	El Cerrito
Morris Sand Pit, Ben Morris	a	Antioch	Antioch
The Roberts Bros.	c	Pittsburg	Clayton
El Dorado County			
Diamond Springs Lime Co.	b	Diamond Springs	Diamond Springs
Fresno County			
Central Rock & Sand Co.	a, b	Sanger	Sanger
Grant-Pacific Rock Co.	a, b	Box 649, Fresno	El Prado
Southern California Edison Co.	a	Edison Bldg., Los Angeles	
Stewart & Nuss	a, b	410 Thorne St., Fresno	Herndon
Volpa Bros.	a	428 W. Whites Bridge, Fresno	Fresno

Glenn County			
E. B. Bishop	a	Box 325, Orland	Wyo
Southern Pacific Co.	a	65 Market St., San Francisco	Wyo
Humboldt County			
Tom Hull	a, b	Eureka	Eureka
Mercer Fraser Co., Essex & Fernbridge	a	2d and Commercial Sts., Eureka	
Northwestern Pacific R. R. Co., Wm. N. Neff, Gen. Sup't	a	Sausalito	Sequoia
Imperial County			
Nixon Pipe Yard	a	Rt. 2, Box 268, El Centro	Seeley
Kern County			
Bakersfield Rock and Gravel Co.	a, b	Box 395, Station A, Bakersfield	Bakersfield
Griffith Co.	a, b	Bakersfield	Bakersfield
Kern Rock Co., Ltd.	a, b	Box 1697, Bakersfield	Kern River
Lassen County			
Red River Lumber Co.	a	Westwood	Westwood
Los Angeles County			
Ace Grading Co.	b	5965 Crenshaw Blvd., Los Angeles	Los Angeles
Arrow Rock Co.	a	Box 155, Monrovia	Monrovia
A. T. & S. F. R R., I. L. Hibbard, Gen. Mgr.	a	609 Kerckhoff Bldg., Los Angeles	Forbes
Azusa Rock & Sand Co.	a, b	Rural Delivery, Azusa	Azusa
Richard R. Ball	a	Box 96, Walteria	Walteria
Blue Diamond Corp., Ltd.	a	1650 S. Alameda St., Los Angeles	El Monte and Roscoe
Wm. J. Bonfield	g	2008 Laurel Canyon Rd., Los Angeles	Hollywood
Chandler Palos Verdes S. & G., L. Chandler	a	Lomita	Lomita
City Rock Co.	a	Box A, Sunland	Sunland
Columbia Construction Co.	b	Box 259, Long Beach	Catalina Island
Consolidated Rock Products Co.	a, b	Box 2950 Terminal Annex or 2730 S. Alameda St., Los Angeles	Los Angeles, Azusa, Roscoe and Monrovia
Eaton Canyon Rock & Sand Co.	a, b	Box 95, East Pasadena	Pasadena
W. F. Glasser, Inc.	b	713 N. Sepulveda, Brentwood Heights, Los Angeles	Brentwood Heights
Graham Bros.	a, b	4731 E. 52d Drive, Los Angeles	El Monte and Roscoe
Granite Material Co.	a, g	8200 Tujunga Ave., Roscoe	Roscoe
John D. Gregg	a, b	Box 110, Whittier	Whittier
Lindauer Corp.	a	Box 208, La Habra	La Habra
Los Angeles Decomposed Granite Co.	g	2171 W. Washington, Los Angeles	Los Angeles
Manning Bros. Rock & Sand Co.	a, b	Irwindale	Irwindale
Mission Rock & Sand Co.	a, b	1172 La Presa Drive, San Gabriel	San Gabriel
Owl Rock Products Co.	a, b, g	P.O. Box 187, Monrovia	Monrovia
Pacific Rock & Gravel Co.	a, b	800 Lane Mortgage Bldg., 208 W. 8th St., Los Angeles	
Edwin Sidebotham & Sons, Inc., Sidebotham Sand Plant	a	McFarland and L Sts., Wilmington	Lomita

a. Sand and gravel. b. Crushed rock (macadam, ballast, rubble, rip-rap, etc.). c. Molding sand. d. Granules for roofing, terrazzo. e. Slag and volcanic cinder. f. Tube-mill pebbles. g. Decomposed granite.

STONE, MISCELLANEOUS—Continued

Under the heading of 'miscellaneous stone' there are four divisions—crushed rock, grinding mill pebbles, paving blocks, and sand and gravel. Crushed rock includes crushed rock that is used in macadam, ballast and for concrete; also rock used for rubble and riprap.

Operator	Product	Address	Location of pit or quarry
Marin County			
Hutchison Co.	b	Box 156, El Cerrito	San Quentin
Marin Gravel Co.	a	Point Reyes	Point Reyes
Mariposa County			
Yosemite National Park	a, b	Yosemite	Yosemite Nat'l Park
Mendocino County			
John Freitas	a	Ukiah	Ukiah
Merced County			
C. V. Jones	a	Rt. 1, Box 132, Winton	Winton
Los Banos Gravel Co.	a	R.F.D., Box 22	Los Banos
Modoc County			
Great Northern Railway, W. R. Minton, Supt.	e	Klamath Falls, Ore.	Mammoth
Moyer Gravel Co.	a	P.O. Box 25, Alturas	Alturas
Monterey County			
Del Monte Properties, C. S. Olmsted	g	Del Monte	Del Monte
Monterey Sands, H. A. Gowman	a	46 W. Alisal St., Salinas	
Pacific Coast Aggregates, Inc.		85 2d St., San Francisco	Lapis and Pratteo
Napa County			
Basalt Rock Co.	b	8th St., Napa	Napa
Juarez Quarry, M. G. Reidenbach	b	Napa	Napa
Orange County			
Geo. T. Calhoun	a	P.O. Box 1741, Santa Ana	Garden Grove
California Rock Co.	a	Rural Delivery, Orange	Orange
Consolidated Rock Products Co.	a, b	2730 S. Alameda St., Los Angeles	Fullerton and Orange
Fowler Sand & Gravel Co.	a	Rt. 1, Box 19-A, Orange	Santa Ana
Foster Sand & Gravel Co.	a	524 W. Commonwealth, Fullerton	
V. J. Frye Foundry Supplies	c	1302 N. Flower St., Santa Ana	Santa Ana
Graham Bros.	a	4731 E. 52d Drive, Los Angeles	San Juan Capistrano
Reynolds Gravel Service	g	Box 499, Orange	Orange
Placer County			
Union Granite Co., Ruhkala Bros.	b	Rocklin	Rocklin
Plumas County			
Western Pac. R. R. Co., F. W. Mason, V. P. & G. M.	e	526 Mission St., San Francisco	

Riverside County			
A. T. & S. F. R.R. Co., I. L. Hibbard, Gen. Mgr.	b	609 Kerckhoff Bldg., Los Angeles	Box Springs
Emil Johnson	b	Perris	Perris
Kumpe-Hauser Corp., Ltd., Ormand Quarry	b	Box 827, Riverside	Bly Junction
San Gorgonio Rock Co.	a, b	Banning	Banning
Service Rock Co.	a	Box 309, Riverside	Riverside
Transit Mixed Concrete Co.	a, b	3464 E. Foothill Blvd., Pasadena	Corona
P. J. Weisel, Industrial Sands	a, c, h	La Habra	Corona
Sacramento County			
American River Sand & Gravel Co.	a	Box 156, Perkins	Perkins
Brighton Sand & Gravel Co.	a, b	P.O. Box 2604, Sacramento	Sacramento
Canon & Co.	c	Box 281, Sacramento	Ben Ali
Del Paso Rock Products Co.	a, b	Rt. 5, Box 1200, Sacramento	Del Paso
Folsom State Prison	a, b	Represa	Represa
Mucke Sand & Gravel Co.	a	1433 57th St., Sacramento	Mayhew
Pacific Coast Aggregates, Inc.	a, b	85 2d St., San Francisco	Fair Oaks, Mayhew and American River
Perkins Gravel Co.	a, b	Perkins	Perkins
Robert Powell Co.	a	Box 815, Sacramento	American River
San Benito County			
Granite Rock Co.	b	Drawer M, Watsonville	Logan
San Bernardino County			
A. T. & S. F. R.R.	a, b	600 Kerckhoff Bldg., Los Angeles	Gale
William C. Buehler	d	1555 Sunset Ave., Pasadena	Lavic
Concrete Rock & Sand Co.	a	899 La Cadena St., Colton	Colton
Consolidated Rock Products Co.	a, b	2730 S. Alameda St., Los Angeles	Claremont
Geo. Herz & Co.	a	Base Line & Lytle Sts., San Bernardino	San Bernardino
Holiday Rock Co.	a, b	Upland	Upland
Johnson Fourth Street Rock Crusher	a, b	305 Lytle St., San Bernardino	San Bernardino
Palm Springs Builders' Supply Co.	a, b	682 S. Palm Canyon Drive, Palm Springs	Palm Springs
Redlands Gravel Co.	a	Redlands	Redlands
San Bernardino Rock & Gravel Co.	a	Box 249, San Bernardino	San Bernardino
Sharp & Fellows Cons. Co.	b	Central Bldg., Los Angeles	Oro Grande
Southern Counties Rock Co.	b	P.O. Box 127, Monrovia	Yermo
Triangle Rock & Gravel Co.	a	San Bernardino	San Bernardino
San Diego County			
Billings Truck Co.*	a, b	1950 Main St., San Diego	Chula Vista
Calaveras Materials Co.	a, b	Oceanside	Oceanside
Canyon Rock Co.	a, b	Box F, Hillcrest Sta., San Diego	San Diego
Claudell & Johnson	a	Box 246, Hillcrest Sta., San Diego	Mission Valley
Crystal Silica Co.	a, c, h	717 E. 61st St., Los Angeles	Oceanside
Daley Corp., Geo. Dailey	a	4430 Boundary St., San Diego	San Diego
Elvira M. Hubbard	c	406 W. Nutmeg St., San Diego	San Diego

a. Sand and gravel. b. Crushed rock (macadam, ballast, rubble, rip-rap, etc.). c. Molding sand. d. Granules for roofing, terrazzo. e. Slag and volcanic cinder. f. Tube-mill pebbles. g. Decomposed granite. h. Filter and blast sand. * Discontinued operations in 1943.

STONE, MISCELLANEOUS—Continued

Under the heading of 'miscellaneous stone' there are four divisions—crushed rock, grinding mill pebbles, paving blocks, and sand and gravel. Crushed rock includes crushed rock that is used in macadam, ballast and for concrete; also rock used for rubble and riprap.

Operator	Product	Address	Location of pit or quarry
San Diego County—Continued			
John T. Momand	f	Carlsbad	Carlsbad
Nelson & Sloan	a	Box 832, Chula Vista	Chula Vista
San Diego Rock & Gravel Co.	a	Chula Vista	Chula Vista
A. Morris Sides	d	1557 Courtney Ave., Los Angeles	----------
San Francisco County			
Charles Harney	b	625 Market St., San Francisco	San Francisco
Mission Quarry Co.	b	210 Balboa Bldg., San Francisco	San Francisco
San Joaquin County			
Frank B. Marks & Sons	a, b	Newman	Newman
Mokelumne Sand & Gravel Co., D. M. Dyer	a	527 E. Lodi Ave., Lodi	Lodi
Pacific Coast Aggregates, Inc.	a, b	85 2d St., San Francisco	Riverbank
Santa Fe Sand & Gravel Co., W. A. Arington	a	Box 271, Escalon	Escalon
San Luis Obispo County			
Guiton Molding Sand, Harold E. Guiton	c	Oceano	Oceano
Walter B. Roselip	a, b	615 Grand Ave., San Luis Obispo	Atascadero
San Mateo County			
Canadas Quarry, California Paving Co.	b	363 N. El Dorado St., San Mateo	Half Moon Bay
Rockaway Quarry, Inc.	a, b	1111 Mills Tower, San Francisco	Rockaway Beach
Donaldson & Co.	c	Rialto Bldg., San Francisco	South San Francisco
Tex Donovan	b	Box 381, Redwood City	Redwood City
Shoreland Co.	b	Pescadero	Pescadero
Santa Barbara County			
Gates Gravel Plant, Frank H. Gates	a	Santa Maria	Sisquoc
Henry G. Petersen	b	Solvang	Solvang
Southern Pacific R.R. Co., Ass't Chief Engineer	b	Southern Pacific Bldg., San Francisco	Arlight
Santa Clara County			
Los Gatos Sand and Gravel Co.	a	Los Gatos	Los Gatos
Pacific Coast Aggregates, Inc.	a, b	85 2d St., San Francisco	Coyote and Campbell
Permanente Cement Co.	b	Permanente	Permanente
Rhodes & Robinson, Stanford Quarry	b	Box 325, Palo Alto	Palo Alto
Western Gravel Corp.	a	Box 855, Campbell	Campbell

Santa Cruz County			
Henry J. Kaiser Co.	a	1522 Latham Square Bldg., Oakland	Olympia
Pacific Coast Aggregates, Inc.	a	85 2d St., San Francisco	Olympia
Pacific Limestone Products Co.	b	Santa Cruz	Santa Cruz
Shasta County			
Columbia Construction Co., Henry J. Kaiser Co.	a	Latham Square Bldg., Oakland	Cottonwood
Diestelhorst Gravel Plant, Chas. Diestelhorst, Jr.	a, b	1078 West St., Redding	Redding
Hein Bros. Basalt Rock Co.	a	Petaluma	Redding
Oaks Gravel Plant, G. E. Oaks	a	1341 Yuba St., Redding	Girvan
Pacific Gas & Electric Co., Att'n W. G. Vincent	a, b	245 Market St., San Francisco	
City of Redding	a, b	Redding	Redding
Southern Pacific R.R. Co., Ass't Chief Engineer	e	Southern Pacific Bldg., San Francisco	Kennett
Siskiyou County			
A. E. Kottinger	a	Mt. Shasta	Mt. Shasta
Southern Pacific R.R. Co., Ass't Chief Engineer	e	Southern Pacific Bldg., San Francisco	Kegg
A. Young	b	345 N. Main St., Yreka	Yreka
Solano County			
J. M. Nelson, Cordelia Quarry	b	Cordelia	Cordelia
Red Rock Quarry, Ltd.	b	Box 671, Vallejo	Vallejo
Sonoma County			
Basalt Rock Co.	a	8th St., Napa	Healdsburg
C. A. Call	a	Fort Ross	Fort Ross
Hein Bros. Basalt Rock Co., Mark Hein, Pres.	b	Petaluma	Petaluma
Stony Point Quarry, W. A. Wilson	b	Petaluma, Star Route	Stony Point
Stanislaus County			
Tony Francisco	a	Crows Landing	Crows Landing
Gravel Products Co.	a	Hughson	Hughson
Wes Haslan	a, b	Oakdale	Oakdale
Hughson Gravel Co.	a	301 N. Santa Cruz Ave., Modesto	Hughson
Frank B. Marks & Sons	a	Newman	Newman
Oakdale Irrigation Dist.	a	Oakdale	Oakdale
Putnam Sand & Gravel Co.	a	Box 486, Modesto	Modesto
J. P. Scanlon, Scanlon Gravel Pit	a	Patterson	Crows Landing
Chas. Warner	a	Modesto	Modesto
Trinity County			
Northwestern Pacific R.R. Co., Wm. N. Neff, Gen. Sup't	b	Sausalito	Island Mountain
Tulare County			
Dinuba Cement Co.	a	Dinuba	Dinuba
O. C. Jeffers	a	1032 River Rd., Porterville	Porterville
Sequoia Rock Crusher	a, b	Lemon Cove	Lemon Cove
Tuolumne County			
Beerman & Jones	b	Sonora	Soulsbyville

a. Sand and gravel. b. Crushed rock (macadam, ballast, rubble, rip-rap, etc.). c. Molding sand. d. Granules for roofing, terrazzo. e. Slag and volcanic cinder. f. Tube-mill pebbles. g. Decomposed granite. h. Filter and blast sand.

STONE, MISCELLANEOUS—Continued

Under the heading of 'miscellaneous stone' there are four divisions—crushed rock, grinding mill pebbles, paving blocks, and sand and gravel. Crushed rock includes crushed rock that is used in macadam, ballast and for concrete; also rock used for rubble and riprap.

Operator	Product	Address	Location of pit or quarry
Ventura County			
Montalvo Rock Co.	a	Box 188, Montalvo	Montalvo
Santa Paula Rock Co.	a, b	Box 671, Santa Paula	Santa Paula
Saticoy Rock Products Co.	a, b	Box 970, Ventura	Saticoy-Ventura
J. S. Toler*	c	1257 Poli St., Ventura	Ventura
Ventura Molding Sand Co.	c	77 S. California St., Ventura	Ventura
Yolo County			
Leroy Kerr	a	Yolo	Yolo
Joe Schwarzgruber	a	Woodland	Woodland
George Summers	a	Woodland	Woodland
Yolo Gravel Co.	a	Box 98, Yolo	Yolo
Yuba County			
Hemstreet & Bell	a, b	501 11th St., Marysville	Marysville
Pacific Coast Aggregates, Inc.	a	85 2d St., San Francisco	Marysville
Yuba River Sand Co.	a	Marysville	Marysville

a. Sand and gravel. b. Crushed rock (macadam, ballast, rubble, rip-rap, etc.). c. Molding sand. d. Granules for roofing, terrazzo. e. Slag and volcanic cinder. f. Tube-mill pebbles. g. Decomposed granite.

* Sold to Ventura Molding Sand Co.

STRONTIUM

Operator	Address	Location of mine
Imperial County		
Pan-Chemical Co., John A. Stevens	1396 N. Harvard St., Claremont	Fish Mts.
San Bernardino County		
Rowe-Buehler Mining Co., Wesley N. Rowe	919 E. Valley Blvd., Rosemead	Lovic

TITANIUM

Operator	Address	Location of mine
Los Angeles County		
Mrs. Harvey R. Smith	421 S. Harvard Blvd., Los Angeles	Hermosa Beach

TUNGSTEN

Principal tungsten properties in California during 1943. (Out of 39 operating properties)

Mine	Operator	Address	Location of mine
Alpine County			
	Alpine Mining Co.	5th and Cottage, San Rafael	Markleeville
Fresno County			
Garnet	P. G. Armstrong, et al.	Auberry	Auberry
Garnet Dyke	Sheridan, Bennett, & Kidder	Kings River Hatchery	Kings River
Kings River	B. Bazuik	717 Voorman, Fresno	Kings River
Kings River Mines	Kings River Mines, L. O. Gillice	600 Rowell Bldg., Fresno	Kings River
Inyo County			
Crawford Dep.	Tungstar Corp., P. N. Stevens	6233 Hollywood Blvd., Los Angeles	Bishop
Highlight & White Cap	Smith & Jackson	P.O. Box 77, Bishop	Bishop
Jack Rabbit	El Diablo Mining Co., H. O. Johanson	Box 567, Bishop	Bishop
Marble	Robert W. Kelso	Bishop	Bishop
Lambert	Kenneth G. Irons	Box 845, Bishop	Bishop
Panaminas	Panaminas Inc., F. C. Buckland, Gen. Mgr.	Box 734, Bishop	Bishop
Pine Creek	United States Vanadium Corp.	30 E. 42d St., New York, N. Y.	Bishop
St. Charles et al.	Pacific Tungsten Co.	9730 Wilshire Blvd., Beverly Hills	Darwin
Kern County			
Bluebird	L. S. Sain	Box 342, Randsburg	Randsburg
Tungsten Chief	T. J. McKee, et al.	Caliente	Caliente
Mariposa County			
Yosemite National Park	Metals Reserve Co., John A. Burgess, Agt.	Carson Hill	Yosemite National Park
Mono County			
Black Rock	A. E., S. H. & John Beauregard	Bishop	Benton
Scheelore	H. A. Van Loon	Bishop	McGee Creek
Nevada County			
North Star	New Verde Mines Co.	Grass Valley	Grass Valley
San Bernardino County			
Atolia	Atolia Mining Co.	1022 Crocker Bldg., San Francisco	Atolia
Gold Basin	Clarence A. Baker	Red Mountain	Red Mountain
Monarch Rand	Monarch Rand Mining Co.	Box 366, Randsburg	Randsburg
Spud Patch Placers	Hoefling Bros.	1820 E St., Sacramento	Atolia
Tulare County			
Carver	A. M. Donnelly	Box 45, Johnsondale	
Will Gill Ranch	Tulare Co. Tungsten Mines	725 Washington Bldg., 311 S. Spring St., Los Angeles	Lindsay
Yokohl Valley	Yokohl Valley Tungsten Mining Co.	Box 36, Dunlap	Dunlap

ZINC

Principal zinc producers in California in 1943. (Not less than 10,000 pounds)

Mine	Operator	Address	Postoffice of mine
Butte County			
Big Bend	Hoefling Bros.	1820 D St., Sacramento	Oroville
Calaveras County			
Collier	Ernest A. Vogt	101 Palm Drive, Piedmont	Copperopolis
Quail Hill	G. Ivan Smith	Copperopolis	Copperopolis
Inyo County			
Darwin group	Darwin Mines, Arthur J. Theis, Trustee	Darwin	Darwin
Montezuma	Eugene Craft	Box 764, Big Pine	Big Pine
Colorado	E. H. Snyder	Keeler	Tecopo
Gold Bottom	Damon & Damon	Bin 14, Trona	Trona
Honolulu-Big Horn	Southwest Lead & Zinc Co.	433 S. Spring St., Los Angeles 13	Trona
Kern County			
Condor (Cully Hayes)	W. W. Stabler	Los Angeles	
Shasta County			
Hornet (Mattie Orebody)	The Mountain Copper Co., Ltd.	216 Pine St., San Francisco	Matheson

SMELTERS, CUSTOM MILLS, ORE AND METAL BUYERS

Reporting Purchase of California Metals (except Gold and Silver) Produced in 1943

Name	Address	Location of plant	Metals reported purchased
American Smelting & Ref. Co.	120 Broadway, New York, N. Y.	Garfield, Utah	Copper, Lead
American Smelting & Ref. Co.	120 Broadway, New York, N. Y.	Hayden, Ariz.	Copper
American Smelting & Ref. Co.	120 Broadway, New York, N. Y.	Murray, Utah	Lead, copper
American Smelting & Ref. Co.	405 Montgomery St., San Francisco	Selby, Calif.	Copper, Lead
American Smelting & Ref. Co.	120 Broadway, New York, N. Y.	Tacoma, Wash.	Copper, Lead
C. L. Ach	1855 Industrial St., Los Angeles	Los Angeles	Tungsten
Bradley & Ekstrom	320 Market St., San Francisco	San Francisco	Chromite, Manganese, Iron
Coast Chemical Division F. W. Berk & Co., Inc.	Sharon Bldg., San Francisco	San Francisco	Quicksilver
General Dry Batteries, Inc.	13000 Athens Ave., Cleveland, Ohio	Cleveland, Ohio	Manganese
H. W. Gould & Co.	Mills Bldg., San Francisco	San Francisco	Quicksilver
The Harshaw Chemical Co.	Box 37, El Segundo	El Segundo	Antimony and quicksilver
International Smelting & Ref. Co.	Tooele, Utah	Tooele, Utah	Copper, Lead, Zinc
Kaiser Co., Inc.	P.O. Box 217, Fontana	Fontana	Iron Ore, Manganese Ore
Magna Copper Co.	Superior, Ariz.	Superior, Ariz.	Copper
Medford Chemical Co.	1026 Santa Fe, Los Angeles	Los Angeles	Quicksilver
Metals Reserve Co.	Washington, D. C.	Various stock piles	Chromite, Manganese Ore, Quicksilver, Tungsten Ore
Pacific Vegetable Oil Co., Bernard T. Rocca	62 Townsend St., San Francisco	San Francisco	Quicksilver
Pacific Zinc Oxide Co.	216 Pine St., San Francisco	Richmond	Zinc
Quicksilver Producers Ass'n, Irving Ballard, Sec'y	407 Sansome St., San Francisco	San Francisco	Quicksilver
Aaron J. Smith	P.O. Box 77, Bishop	Bishop	Tungsten Ore
U. S. Smelting, Refining & Mining Co.	Newhouse Bldg., Salt Lake City, Utah	Midvale, Utah	Copper, Lead, Zinc
West Coast Tungsten Co.	9730 Wilshire Blvd., Beverly Hills	Darwin	Tungsten
Western Gold & Platinum Works	589 Bryant St., San Francisco	San Francisco	Platinum
Wildberg Bros. Smelting & Ref. Co.	742 Market St., San Francisco	San Francisco	Platinum

APPENDIX

PUBLIC RESOURCES CODE

An act to establish a Public Resources Code, thereby consolidating and revising the law relating to natural resources, the conservation, utilization, and supervision thereof, and matters incidental thereto, and to repeal certain acts and parts of acts specified herein.

Chapter 93 (Stats. 1939.)

The people of the State of California do enact as follows:

GENERAL PROVISIONS

1. This act shall be known as the Public Resources Code.

2. The provisions of this code, in so far as they are substantially the same as existing provisions relating to the same subject matter shall be construed as restatements and continuations thereof and not as new enactments.

3. All persons who, at the time this code goes into effect, hold office under any of the acts repealed by this code, which offices are continued by this code, continue to hold the same according to the former tenure thereof.

4. No action or proceeding commenced before this code takes effect, and no right accrued, is affected by the provisions of this code, but all procedure thereafter taken therein shall conform to the provisions of this code so far as possible.

5. Unless the context otherwise requires, the general provisions hereinafter set forth shall govern the construction of this code.

6. Division, part, chapter, article, and section headings contained herein shall not be deemed to govern, limit, modify or in any manner affect the scope, meaning, or intent of the provisions of any division, part, chapter, article, or section hereof.

7. Whenever, by the provisions of this code, an administrative power is granted to a public officer or a duty imposed upon such officer, the power may be exercised or the duty performed by a deputy of the officer or by a person authorized pursuant to law.

8. Writing includes any form of recorded message capable of comprehension by ordinary visual means. Whenever any notice, report, statement or record is required by this code, it shall be made in writing in the English language.

9. Whenever any reference is made to any portion of this code or of any other law of this State, such reference shall apply to all amendments and additions thereto now or hereafter made.

10. "Section" means a section of this code unless some other statute is specifically mentioned.

11. The present tense includes the past and future tenses; and the future the present.

12. The masculine gender includes the feminine and neuter.

13. The singular number includes the plural, and the plural the singular.

14. "County" includes "city and county."

15. "Shall" is mandatory and "may" is permissive.

16. "Oath" includes affirmation.

17. "Signature" or "subscription" includes mark when the signer or subscriber can not write, such signer's or subscriber's name being written near the mark by a witness who writes his own name near the signer's or subscriber's name; but a signature or subscription by mark can be acknowledged or can serve as a signature or subscription to a sworn statement only when two witnesses so sign their own names thereto.

18. If any provision of this code, or the application thereof to any person or circumstances, is held invalid the remainder of the code, and the application of its provisions to the other persons or circumstances, shall not be affected thereby.

DIVISION 1. THE DEPARTMENT OF NATURAL RESOURCES

501. There is in the State government a Department of Natural Resources. The department shall be conducted under the control of an executive officer known as the Director of Natural Resources. The director shall be appointed by and hold office at the pleasure of the Governor and shall receive a salary of six thousand dollars a year.

502. Except as in this division otherwise provided, the provisions of Article 2, Chapter 3, Title 1, Part 3 of the Political Code shall govern and apply to the conduct of the Department of Natural Resources in every respect the same as if such provisions were herein set forth at length, and wherever in that article the term "head of the department" or similar designation occurs, it shall for the purposes of this divvision mean the Director of Natural Resources.

503. For the purposes of administration the department shall be organized by the director, subject to the approval of the Governor, in such manner as he deems necessary properly to segregate and conduct the work of the department. The director may appoint, in accordance with the civil service and other provisions of law, such deputies, officers, and other expert and clerical assistants as may be necessary.

504. The work of the department shall be divided into at least four divisions, known as Division of Forestry, the Division of Parks, The Division of Fish and Game, and The Division of Mines.

505. The Division of Forestry shall be administered through a chief who shall be known as the State Forester. He shall be a technically trained forester, appointed by the director upon nomination by the State Board of Forestry. General policies for the guidance of the Division of Forestry shall be determined by a State Board of Forestry which shall consist of seven members appointed by and holding office at the pleasure of the Governor. Of the seven members one shall be familiar with the pine timber industry, one with the redwood industry, one with live stock industry, one with general agriculture, and one with the problems of water conservation.

506. The Division of Parks shall be administered through a chief who shall be appointed by the director upon nomination by the State Park Commission. General policies for the administration of the State park system shall be determined by the State Park Commission which shall consist of five members appointed by and holding office at the pleasure of the Governor.

507. The Division of Minerals shall be administered through a chief who shall be known as the State Mineralogist. He shall be a technically trained mining engineer, appointed by the director upon nomination by the State Mining Board. General policies for the guidance of the Division of Mines shall be determined by a State Mining Board, which shall consist of five members appointed by and holding office at the pleasure of the Governor.

508. The Division of the Department of Natural Resources for the supervision of oil and gas shall be in charge of a chief, known as the State Oil and Gas Supervisor.

509. The salaries of the chiefs of the Divisions of Forestry and Parks shall be fixed by the director with the approval of the Governor. The director and the chief of each division, before entering upon his duties, shall execute and deliver to the State an official bond in the sum of twenty-five thousand dollars conditioned upon the faithful performance of his duties.

510. The members of the Board of Forestry and the State Park Commission shall serve without compensation, but shall be entitled to their actual necessary expenses incurred in the performance of their duties.

512. The Department of Natural Resources may expend the money in any appropriation or in any special fund in the State treasury made available by law for the administration of the statutes the administration of which is committed to the department, or for the use, support, or maintenance of any board, bureau, commission, department, office, or officer whose duties, powers, and functions have been transferred to and conferred upon the department. Such expenditures by the department shall be made in accordance with law in carrying out the purposes for which the appropriations were made or the special funds created.

513. The department shall have possession and control of all records, books, papers, offices, equipment, supplies, moneys, funds, appropriations, land and other

property, real or personal held for the benefit or use of all bodies, offices, and officers whose duties, powers, and functions have been transferred to and conferred upon the department.

514. Nothing in this code is intended to supersede, modify or change the effect of the enactment of section 373g of the Political Code, and wherever in this code reference is made to any officer or agency of the Department of Natural Resources, it is made in the sense and with the same legal effect as was attributable thereto in the statute whence derived and which would continue to be so attributable but for the adoption of this code.

DIVISION 2. MINES AND MINING

CHAPTER 1. DEFINITIONS

2001. Unless the context otherwise requires, the definitions hereinafter set forth shall govern the construction of Division 2 of this code.

2002. "Department" in reference to the government of this State, means the Department of Natural Resources.

2003. "Division" in reference to the government of this State, means the Division of Mines in the Department of Natural Resources.

2004. "Person" includes any individual, firm, association, corporation, or any other group or combination acting as a unit.

CHAPTER 2. THE DIVISION OF MINES

2200. For the purposes of this chapter "mine" includes all mineral bearing properties of whatever kind or character, whether underground, quarry, pit, well, spring or other source from which any mineral substance is or may be obtained. "Mineral" for the purposes of this chapter includes all mineral products both metallic and nonmetallic, solid, liquid or gaseous, and mineral waters of whatever kind or character.

2201. The State Mineralogist shall employ competent geologists, field assistants, qualified specialists, and office employees when necessary in the execution of the plans and operations of the division under this chapter and shall fix their compensation.

2202. The State Mineralogist shall maintain offices, and a museum, library, and laboratory in San Francisco for the purposes provided in this chapter.

2203. The State Mineralogist shall make a biennial report to the Governor on or before the fifteenth day of September next preceding the regular session of the Legislature.

2204. The State Mineralogist may receive on behalf of this State, for the use and benefit of the division, gifts, bequests, devices, and legacies of real or other property and may use the same in accordance with the wishes of the donors. If no instructions are given by the donors, the State Mineralogist shall manage, use, and dispose of the gifts, bequests, and legacies for the best interests of the division and in such manner as he may deem proper.

2205. The State Mineralogist shall:

(a) Make, facilitate, and encourage special studies of the mineral resources and mineral industries of the State.

(b) Collect statistics concerning the occurrence and production of the economically important minerals and the methods pursued in making their valuable constituents available for commercial use.

(c) Make a collection of typical geological and mineralogical specimens, especially those of economic and commercial importance such collection constituting the museum of the division.

(d) Provide a library of books, reports, and drawings bearing upon the mineral industries, the sciences of mineralogy and geology, and the arts of mining and metallurgy, such library constituting the library of the division.

(e) Make a collection of models, drawings, and descriptions of the mechanical appliances used in mining and metallurgical processes.

(f) Preserve and so maintain such collections and library as to make them available for reference and examination, and open to public inspection at reasonable hours.

(g) Maintain, in effect, a bureau of information concerning the mineral industry of this State to consist of such collections and library, and arrange, classify, catalogue, and index the data therein contained, in a manner to make the information available to those desiring it.

(h) Issue from time to time such bulletins as he may deem advisable concerning the statistics and technology of the mineral industries of this State.

2206. The State Mineralogist may prepare a special collection of ores and minerals of California to be sent to or used at any world's fair or exposition in order to display the mineral wealth of the State.

2207. The owner, lessor, lessee, agent, manager, or other person in charge of any mine of whatever kind or character within the State shall forward to the State Mineralogist, upon his request, at his office, not later than the thirty-first day of March in each year, a detailed report upon forms which will be furnished showing the character of the mine, the number of men employed, the method of working the mine and the general condition thereof, and the total mineral production for the past year. He shall also furnish any additional information relative to such mine that the State Mineralogist may from time to time require for the proper discharge of his official duties. Any such person who fails to comply with the provisions of this section is guilty of a misdemeanor.*

2208. The State Mineralogist or a qualified assistant may at any time enter or examine any and all mines, quarries, wells, mills, reduction works, refining works, and other mineral properties or working plants in this State in order to gather data to comply with the provisions of this chapter.

2209. The State Mineralogist may fix a price upon and dispose of to the public all publications of the division, including reports, bulletins, maps, registers, or other publications. The price shall approximate the cost of publication and distribution. He may also furnish the publications of the division to public libraries without cost and may exchange publications with geological surveys, scientific societies, and other like bodies.

2210. All money received by the division from sales of publications issued by the division shall be deposited at least once each month in the State treasury to the credit of the Division of Mines revolving printing fund, which fund is continued in existence. This fund is appropriated for the use of the division, in addition to such other funds as may be appropriated for the printing and publishing of reports, bulletins, and maps issued by the division. The State Controller may require financial reports from the division or any officer thereof.

(Added by Stats. 1939, Ch. 96, as part of codification.)

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* Sec. 19 of the Penal Code of California provides: "Except in cases where a different punishment is prescribed by this code, every offense declared to be a misdemeanor is punishable by imprisonment in a county jail not exceeding six months, or by a fine not exceeding five hundred dollars, or both."

PUBLICATIONS OF THE DIVISION OF MINES

During the past sixty-four years, in carrying out the provisions of the organic act creating the former California State Mining Bureau, there have been published many reports, bulletins and maps which go to make up a library of detailed information on the mineral industry of the State, a large part of which could not be duplicated from any other source.

One feature that has added to the popularity of the publications is that many of them have been distributed without cost to the public, and even the more elaborate ones have been sold at a price which barely covers the cost of printing.

Owing to the fact that funds for the advancing of the work of this department have usually been limited, the reports and bulletins mentioned are printed in limited editions many of which are now entirely exhausted.

Copies of such publications are available for reference, however, in the offices of the Division of Mines, in the Ferry Building, San Francisco; State Building, Los Angeles; State Office Building, Sacramento; Redding; and Division of Oil and Gas at Santa Barbara, Santa Paula, Taft, Bakersfield, Coalinga. They may also be found in many public, private and technical libraries in California and other states and foreign countries.

A catalog of all publications from 1880 to 1917, giving a synopsis of their contents, is issued as Bulletin No. 77.

Publications in stock may be obtained postpaid by addressing the San Francisco, Los Angeles or Sacramento offices and enclosing the requisite amount.

Remittances of stamps in an amount not to exceed 26 cents, currency or coin will be accepted at sender's risk. Payment is preferred in the form of money orders.

Money orders should be made payable to the Division of Mines.

Write for latest revised price list.

NOTE.—The Division of Mines frequently receives requests for some of the early Reports and Bulletins now out of print, and it will be appreciated if parties having such publications and wishing to dispose of them will advise this office.

REPORTS

Asterisks (**) indicate the publication is out of print.

	Price (including postage and sales tax)
**Report I of the State Mineralogist, 1880, 43 pp. Henry G. Hanks	----
**Report II of the State Mineralogist, 1882, 514 pp., 4 illustrations, 1 map. Henry G. Hanks	----
**Report III of the State Mineralogist, 1883, 111 pp., 21 illustrations. Henry G. Hanks	----
**Report IV of the State Mineralogist, 1884, 410 pp., 7 illustrations. Henry G. Hanks	----
**Report V of the State Mineralogist, 1885, 234 pp., 15 illustrations, 1 geological map. Henry G. Hanks	----
Report VI of the State Mineralogist, Part I, 1886, 145 pp., 3 illustrations, 1 map. Henry G. Hanks—Price $0.75, sales tax $0.02	$0.77
Part II, 1887, 222 pp., 36 illustrations. William Irelan, Jr.—Price $0.75, sales tax $0.02	.77
**Report VII of the State Mineralogist, 1887, 315 pp. William Irelan, Jr.	----
**Report VIII of the State Mineralogist, 1888, 948 pp., 122 illustrations. William Irelan, Jr.	----
**Report IX of the State Mineralogist, 1889, 352 pp., 57 illustrations, 2 maps. William Irelan, Jr.—Price $1.15, sales tax $0.03	1.18
**Report X of the State Mineralogist, 1890, 983 pp., 179 illustrations, 10 maps. William Irelan, Jr.	----
**Report XI (First Biennial) of the State Mineralogist, for the two years ending September 15, 1892, 612 pp., 73 illustrations, 4 maps. William Irelan, Jr.—Price $1.50, sales tax $0.04	1.54
**Report XII (Second Biennial) of the State Mineralogist, for the two years ending September 15, 1894, 541 pp., 101 illustrations, 5 maps. J. J. Crawford	----
**Report XIII (Third Biennial) of the State Mineralogist, for the two years ending September 15, 1896, 726 pp., 93 illustrations, 1 map. J. J. Crawford	----
Chapters of the State Mineralogist's Report XIV, Biennial Period, 1913-1914, Fletcher Hamilton:	
**Mines and Mineral Resources, Amador, Calaveras and Tuolumne Counties, 172 pp., paper	----
Mines and Mineral Resources, Colusa, Glenn, Lake, Marin, Napa, Solano, Sonoma and Yolo Counties, 208 pp., paper—Price $0.50, sales tax $0.01	.51
Mines and Mineral Resources, Del Norte, Humboldt and Mendocino Counties, 59 pp., paper—Price $0.35, sales tax $0.01	.36
Mines and Mineral Resources, Fresno, Kern, Kings, Madera, Mariposa, Merced, San Joaquin and Stanislaus Counties, 220 pp., paper—Price $0.75, sales tax $0.02	---- .77
Mines and Mineral Resources of Imperial and San Diego Counties, 113 pp., paper—Price $0.50, sales tax $0.01	.51
**Mines and Mineral Resources, Shasta, Siskiyou and Trinity Counties, 180 pp., paper	----
**Report XIV of the State Mineralogist, for the Biennial Period 1913-1914, Fletcher Hamilton, 1915: A General Report on the Mines and Mineral Resources of Amador, Calaveras, Tuolumne, Colusa, Glenn, Lake, Marin, Napa, Solano, Sonoma, Yolo, Del Norte, Humboldt, Mendocino, Fresno, Kern, Kings, Madera, Mariposa, Merced, San Joaquin, Stanislaus, San Diego, Imperial, Shasta, Siskiyou and Trinity Counties, 974 pp., 275 illustrations, cloth	----
Chapters of the State Mineralogist's Report, XV Biennial Period, 1915-1916, Fletcher Hamilton:	
**Mines and Mineral Resources, Alpine, Inyo and Mono Counties, 176 pp., paper	----
Mines and Mineral Resources, Butte, Lassen, Modoc, Sutter and Tehama Counties, 91 pp., paper—Price $0.50, sales tax $0.01	.51

REPORTS—Continued

Asterisks (**) indicate the publication is out of print. Price (including postage and sales tax)

Mines and Mineral Resources, **El Dorado, Placer, Sacramento and Yuba Counties, 198 pp., paper ----

Mines and Mineral Resources, **Monterey, San Benito, San Luis Obispo, Santa Barbara and Ventura Counties, 183 pp., paper ----

Mines and Mineral Resources, **Los Angeles, Orange and Riverside Counties, 136 pp., paper ----

Mines and Mineral Resources, **San Bernardino and Tulare Counties, 186 pp., paper ----

**Report XV of the State Mineralogist, for the Biennial Period 1915-1916, Fletcher Hamilton, 1917:
A General Report on the Mines and Mineral Resources of **Alpine, Inyo, Mono, Butte, Lassen, Modoc, Sutter, Tehama, Placer, Sacramento, Yuba, Los Angeles, Orange, Riverside, San Benito, San Luis Obispo, Santa Barbara, Ventura, San Bernardino and Tulare** Counties, 990 pp., 413 illustrations, cloth ----

Chapters of the State Mineralogist's **Report XVI, Biennial Period, 1917-1918, Fletcher Hamilton:**

Mines and Mineral Resources of **Nevada** County, 270 pp., paper
Price $1.00, sales tax $0.03 $1.03

Mines and Mineral Resources of **Plumas** County, 188 pp., paper
Price $0.50, sales tax $0.01 .51

Mines and Mineral Resources of **Sierra** County, 144 pp., paper
Price $0.75, sales tax $0.02 .77

Report XVII of the State Mineralogist, **1920,** 'Mining in California during 1920,' Fletcher Hamilton; 562 pp., 71 illustrations, cloth
Price $2.50, sales tax $0.06 2.56

Report XVIII of the State Mineralogist, **1922,** 'Mining in California,' Fletcher Hamilton. Chapters published monthly beginning with January, 1922:

**January, **February, **March, April, May, June, July, August, September, October, November, December, 1922 Price $0.30, sales tax $0.01 .31

Chapters of **Report XIX** of the State Mineralogist, 'Mining in California,' Fletcher Hamilton and Lloyd L. Root. January, February, March, September, 1923 Price $0.30, sales tax $0.01 .31

Chapters of **Report XX** of the State Mineralogist, 'Mining in California,' Lloyd L. Root. Published quarterly. January, April, July, October, **1924,** per copy Price $0.30, sales tax $0.01 .31

Chapters of **Report XXI** of the State Mineralogist, 'Mining in California,' Lloyd L. Root. Published quarterly:

January, **1925.** Mines and Mineral Resources of **Sacramento, Monterey and Orange** Counties Price $0.30, sales tax $0.01 .31

April, **1925.** Mines and Mineral Resources of **Calaveras, Merced, San Joaquin, Stanislaus and Ventura** Counties
Price $0.30, sales tax $0.01 .31

July, **1925. Mines and Mineral Resources of **Del Norte, Humboldt and San Diego** Counties ----

October, **1925. Mines and Mineral Resources of **Siskiyou, San Luis Obispo and Santa Barbara** Counties ----

Chapters of **Report XXII** of the State Mineralogist, 'Mining in California,' Lloyd L. Root. Published quarterly:

January, **1926. Mines and Mineral Resources of **Trinity and Santa Cruz** Counties ----

April, **1926.** Mines and Mineral Resources of **Shasta, San Benito and Imperial** Counties Price $0.30, sales tax $0.01 .31

July, **1926.** Mines and Mineral Resources of **Marin and Sonoma** Counties Price $0.30, sales tax $0.01 .31

October, **1926. Mines and Mineral Resources of **El Dorado and Inyo** Counties, also report on **Minaret District,** Madera County ----

REPORTS——Continued

Asterisks (**) indicate the publication is out of print.

Price (including postage and sales tax)

Chapters of Report XXIII of the State Mineralogist, 'Mining in California,' Lloyd L. Root. Published quarterly:

January, 1927. Mines and Mineral Resources of Contra Costa County; Santa Catalina Island——Price $0.30, sales tax $0.01 $0.31

April, 1927. Mines and Mineral Resources of Amador and Solano Counties Price $0.30, sales tax $0.01 .31

**July, 1927. Mines and Mineral Resources of Placer and Los Angeles Counties ---

October, 1927. Mines and Mineral Resources of Mono County—— Price $0.30, sales tax $0.01 .31

Chapters of Report XXIV of the State Mineralogist, 'Mining in California,' Lloyd L. Root. Published quarterly:

January, 1928. Mines and Mineral Resources of Tuolumne County—— Price $0.30, sales tax $0.01 .31

April, 1928. Mines and Mineral Resources of Mariposa County—— Price $0.30, sales tax $0.01 .31

**July, 1928. Mines and Mineral Resources of Butte and Tehama Counties ----

October, 1928. Mines and Mineral Resources of Plumas and Madera Counties ——Price $0.30, sales tax $0.01 .31

Chapters of Report XXV of the State Mineralogist, 'Mining in California,' Walter W. Bradley. Published quarterly:

**January, 1929. Mines and Mineral Resources of Lassen, Modoc and Kern Counties; also on Special Placer Machines ----

**April, 1929. Mines and Mineral Resources of Sierra, Napa, San Francisco and San Mateo Counties ----

July, 1929. Mines and Mineral Resources of Colusa, Fresno and Lake Counties ——Price $0.30, sales tax $0.01 .31

October, 1929. Mines and Mineral Resources of Glenn, Alameda, Mendocino and Riverside Counties——Price $0.30, sales tax $0.01 .31

Chapters of Report XXVI of the State Mineralogist, 'Mining in California,' Walter W. Bradley. Published quarterly:

January, 1930. Mines and Mineral Resources of Santa Clara County; also Barite in California——Price $0.40, sales tax $0.01 .41

**April, 1930. Mines and Mineral Resources of Nevada County; also Mineral Paint Materials in California ----

**July, 1930. Mines and Mineral Resources of Yuba and San Bernardino Counties; also Commercial Grinding Plants in California ----

October, 1930. Mines and Mineral Resources of Butte, Kings and Tulare Counties; also Geology of Southwestern Mono County (Preliminary) Price $0.40, sales tax $0.01 .41

Chapters of Report XXVII of the State Mineralogist, 'Mining in California,' Walter W. Bradley. Published quarterly:

January, 1931. Preliminary Report of Economic Geology of the Shasta Quadrangle. Beryllium and Beryl. The New Tariff and Nonmetallic Products. Crystalline Talc. Decorative effects in Concrete—— Price $0.40, sales tax $0.01 .41

April, 1931. Stratigraphy of the Kreyenhagen Shale. Diatoms and Silicoflagellates of the Kreyenhagen Shale. Foraminifera of the Kreyenhagen Shale. Geology of Santa Cruz Island—— Price $0.40, sales tax $0.01 .41

**July, 1931. (Yuba, San Bernardino Counties.) Feldspar, Silica, Andalusite and Cyanite Deposits of California. Note on a Deposit of Andalusite in Mono County; its occurrence and chemical importance. Bill creating Trinity and Klamath River Fish and Game District and its effect upon mining ----

October, 1931. (Alpine County.) Geology of the San Jacinto Quadrangle south of San Gorgonio Pass, California. Notes on Mining Activities in Inyo and Mono Counties in July, 1931——Price $0.40, sales tax $0.01 .41

Chapters of Report XXVIII of the State Mineralogist, 'Mining in California,' Walter W. Bradley. Published quarterly:

REPORTS—Continued

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